REVISION OF SOME INDIAN GENERA OF THE FAMILY MYMARIDAE (HYMENOPTERA: CHALCIDOIDEA)

THESIS

THESIS SUBMITTED FOR THE AWARD OF THE DEGREE OF DOCTOR OF

Philosophy

In

Zoology

BY

TABASSUM REHMAT

UNDER THE SUPERVISION OF

DR. (MRS.) SHOEBA BINTE ANIS

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DEPARTMENT OF ZOOLOGY
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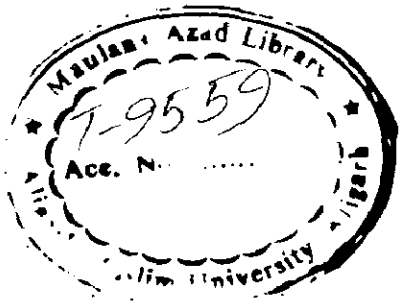

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This is to certify that **Ms. Tabassum Rehmat** has completed her Ph.D. thesis entitled **"Revision of some Indian Genera of the Family Mymaridae (Hymenoptera: Chalcidoidea)"**, under my supervision and guidance. This thesis contains the original research work, and will be a distinct addition to our knowledge on Indian Mymaridae. I have permitted Ms. Tabassum Rehmat to submit it to the Aligarh Muslim University, Aligarh, in partial fulfillment of the requirements for the award of the degree of **Doctor of Philosophy**.

Shoeba

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ANNEXURE - I

CANDIDATES'S DECLARATION

I, **Tabassum Rehmat**, Department of Zoology certify that the work embodied in this Ph.D. thesis is my own bonafide work carried out by me under the supervision of **Dr. (Mrs.) Shoeba Binte Anis** at Aligarh Muslim University, Aligarh. The matter embodied in this Ph. D. thesis has not been submitted for the award of any other degree.

I declare that I have faithfully acknowledge, given credit to and referred to the research workers wherever their works have been cited in the text and the body of the thesis. I further certify that I have not willfully lifted up some other's work, para, text, data, result, etc. reported in the journals, books, magazines, reports, dissertations, theses, etc., or available at web-sites and included them in this Ph.D. thesis and cited as my own work.

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Tabassum Rehmat
(Signature of the candidate)

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This is to certify that the above statement made by the candidate is correct of the best of my/our knowledge.

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Tabassum Rehmat

(Tabassum Rehmat)

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INTRODUCTION

Members of the family Mymaridae (Hymenoptera: Chalcidoidea) are often referred to as 'fairy flies'. The family Mymaridae is cosmopolitan in distribution that occurs in almost every habitat and is available throughout the year. The mymarids are small in size measuring about 0.13–1.5mm. The mymarid fauna is represented by 103 genera and more than 1400 species across the world (Noyes, 2015). However, this family is represented in India by 32 genera (Anis & Rehmat, 2013; Manickavasagam & Rameshkumar, 2013 & Noyes, 2015), including one genus recorded in this work (31% of world fauna), but the number of species is small, only 134 species forming 9.5% of world fauna. Out of 32 genera, only 4 genera contain a majority of the species, and have been taxonomically studied. These are *Gonatocerus* Nees (53 species: Zeya & Hayat, 1995); *Polynema* Haliday (11 species: Hayat & Anis, 1999c), *Acmopolynema* Ogloblin (8 species: Hayat & Anis, 1999b, Hayat *et al.*, 2008) and *Camptoptera* (9 species: Subba Rao, 1989, Rehmat & Anis, 2014a). The remaining 28 genera are each represented by 1–4 species.

The most important impetus to the taxonomic study of mymarids got from the fact that these insects are exclusively egg parasitoids (oophagous). Biological studies, though limited to a few species, have shown that mymarids parasitize eggs of insects belonging to several orders, notably Hemiptera, Lepidoptera, Coleoptera, Diptera, Orthoptera and Psocoptera (Huber, 1986). Some mymarids parasitize the submerged eggs of aquatic insects (Dytiscidae: Coleoptera) or eggs laid in an aquatic medium (Odonata) (Matheson & Crosby, 1912; Jackson, 1966).

This oophagus habit of mymarids, lead to the recognition as potential agents in the biocontrol of insect pests. For example, the Australian species, *Anaphes nitens* (Girault), was used successfully to control *Gonipterus scutellus* Gyllanhal (Coleoptera: Curculionidae), a pest of Eucalyptus in South Africa (DeBach & Rosen 1991, as *Patasson nitens*) and in other countries. The smaller size of these insects and the lack of species level taxonomic work on mymarids have impeded their use in biological control programmes (Triapitsyn, 2002).

In spite of considerable progress made in the taxonomic and phylogenetic studies on the world Mymaridae (Huber, 1986; Triapitsyn, 2001; Schauff, 1984) resulting, as noted above, in the establishment of 104 genera and 1400 species worldwide, the situation on the Indian fauna deserves attention.

The recent collections of several thousands of mymarid specimens especially from the north, north-eastern and southern States of India, prompted the author to take up detail taxonomic studies on this relatively poorly studied group. These collections yielded species belonging to at least 22 genera. However, the present thesis on the "Revision of some Indian genera of the family Mymaridae (Hymenoptera: Chalcidoidea)", the author covers the following 14 genera, including the genus *Schizophragma* Ogloblin, which is recently recorded from India (Rehmat & Anis, 2014b):*Acmopolynema* Ogloblin, *Alaptus* Westwood, *Arescon* Walker, *Camptoptera* Foerster, *Eofoersteria* Mathot, *Erythmelus* Enock, *Himopolynema* Taguchi, *Litus* Haliday, *Palaeoneura* Waterhouse, *Polynema* Haliday, *Pseudanaphes* Noyes &Valentine, *Schizophragma* Ogloblin, *Stephanodes* Enock and *Stethynium* Enock.

The present work deals of 14 genera and 81 species, of which the genus *Schizophragma* is a new record from India. Also 16 new species are described and 6 species are recorded for the first time, and 40 known species are recognized. Two synonymies are also proposed. The genera are diagnosed and their species are either described (new species) or redescribed/diagnosed (known species) and relevant information is given on hosts, distribution in India, number of species in the world and in India and all the species are illustrated by photographs/drawings. Original citations to all genera and species and their synonyms are given. Also to make the genera identifiable, a key to the Indian genera and keys to the subgenera/species of the genera *Acmopolynema*, *Alaptus*, *Arescon*, *Camptoptera*, *Erythmelus*, *Himopolynema*, *Litus*, *Palaeoneura* and *Polynema* are given. Key and checklist to world species of genus *Eofoersteria* Mathot and *Schizophragma* Ogloblin respectively are also provided.

An attempt was also made to study the phylogeny of Indian genera of the family Mymaridae. The phylogenetic analysis is based on female morphological characters only and includes 31 Indian genera, genus *Stephnocampta* Mathot was

excluded from analysis as this genus was recorded on a male specimen. The genus *Mymaromma* Girault (Hymenoptera: Mymarommatoidea) is used as the outgroup for the phylogenetic analysis. There were 43 binary and multistate morphological characters coded for analysis; all characters were treated as plesiomorphic and apomorphic. Data matrix of binary and multistate morphological characters were coded for analysis to conduct a maximum parsimony using PAUP* 4.0b10 (Swofford, 2002). On the basis of a hypothesis of relationships of Indian genera in present work, it is concluded that basically 11 groups have arised from the present study as follows; *Polynema* group, *Anagrus* group, *Anaphes* group, *Gonatocerus* group, *Ooctonus* group *Anagroidea* group, *Cleruchus* group, *Australomymar* group, *Alaptus* group, *Arescon* group and *Camptoptera* group. This analysis supports classification of the family Mymaridae into different generic groups by Lin. *et al.* (2007). This phylogenetic study was done mainly to substantiate the research work and should be considered as preliminary, as it was not the part of my thesis.

HISTORICAL REVIEW OF THE FAMILY MYMARIDAE

Review of world literature

The family Mymaridae was studied as early as the nineteenth century by Walker and Foerster together with their contribution to other chalcidoid families. A detailed review of the world Mymaridae, including a list of these valid genera and number of species known from all the zoogeographical regions, was given by Huber (1986). It may be noted that during the last 25 years tremendous progress has been made, but mainly on the Nearctic and Neotropical fauna of Mymaridae. None of the publications deal with the world Mymaridae. Debauche (1948) and Kryger (1950) provided historical reviews of the family. Schauff (1984) and Gibson (1986) discussed the relationships of mymarids and provided evidence that mymarids are among the most primitive of chalcidoids and apparently the sister group to the rest of Chalcidoidea. Huber, (1986) reviewed the history, systematics, biology and hosts of Mymaridae and Huber (2005) listed the genus-group and 18 family group names. Generic keys of Mymaride have been provided by different authors for different geographic realms. These keys are: world genera (Annecke & Doutt, 1961); Holarctic genera (Schauff, 1984); Palaearctic genera (Triapitsyn & Huber, 2000); Nearctic genera (Huber, 1997); new world genera (Yoshimoto, 1990); Oriental genera (Subba Rao & Hayat, 1983, 1986) and New Zealand genera (Noyes & Valentine, 1989). Huber (1988) studied the species groups of *Gonatocerus* Nees in North America with a revision of the *sulphuripes*- and *ater*- groups on the basis of Nearctic material. Lin *et al.* (2007) provided a generic review of the Australian Mymaridae and recognized forty-five genera and listed the Australian species in each genus. Review of *Schizophragma* Ogloblin and the non-Australian species of *Stethynium* Enock have been provided by Huber (1987). Huber & Lin (1999) provided world review of the *Camptoptera*-group of genera. Huber (2003) provided review on the genus *Chaetomymar* Ogloblin (=*Palaeoneura* Waterhouse). Recently, Triapitsyn made important contributions to the taxonomy of world Mymaridae. The following publications deserve mention: Triapitsyn & Beardsley (2000) on Hawaiian species of *Anagrus*; Triapitsyn & Berezovskiy (2007) on Oriental and Australian *Acmopolynema* and *Palaeoneura;* Triapitsyn *et al.* (2006) on Nearctic species of *Neomymar*; Triapitsyn (2010) on Palaearctic and Oriental *Ooctonus*;

Triapitsyn *et al.* (2010) on Neotropical *Gonatocerus* Nees; Triapitsyn *et al.* (2013) provided taxonomic notes on three species of *Cleruchus* Enock described by S. Novicky from Europe. Resently Huber & Noyes (2013) described a new genus and species, *Tinkerbella nana*, along with comment on genus *Kikiki* Huber & Beardsley, and a discussion on small size limits in arthropods. Triapitsyn (2014) described *Nepolynema* (as new genus), with two new species from Costa Rica and Papua New Guinea. Recently a revision of the genus *Camptoptera* Foerster from the Palaearctic region, with notes on some extralimital species provided by Triapitsyn (2014).

Review of the Indian Literature

The first species of Mymaridae to be described from India was *Alaptus magnanimus* Annandale (1909), followed by Kieffer's (1913a) description of *Gonatocerus longicrus*. Mani's (1938) catalogue lists only 3 species of Mymaridae from India. After a long gap of nearly 28 years after Kieffer's publication, Mani (1942) described two new species of *Alaptus* Westwood and one species of *Mymar* Curtis. Later, in the 1950's and 1960's some contributions were made by Subba Rao (1966), Subba Rao & Kaur (1959, 1960), Narayanan, Subba Rao & Kaur (1960), Narayanan & Subba Rao (1961), and Narayanan (1961).

Mani & Saraswat (1973) described several species, mainly in the genera *Gonatocerus* Nees and *Polynema* Haliday. In two separate papers Viggiani (1978a, b), described species of *Camptoptera* Foerster and *Eofoersteria* Mathot from India.

Mani (1989) published on the fauna of Mymaridae together with other Chalcidoidea. Simultaneously, Subba Rao (1989) described a large number of species in several genera, but mainly *Acmopolynema* Ogloblin, *Gonatocerus* and *Camptoptera*, and recorded *Dicopomorpha* Ogloblin (as *Dicopulus* Ogloblin) for the first time from India. In the 1990's major contributions to the Indian Mymaridae were made by Hayat (1992), on several genera; Zeya & Hayat (1995), on a revision of Indian *Gonatocerus*; and Hayat & Anis (1999a, b, c) on *Acmopolynema*, *Polynema* and recorded *Ptilomymar* Annecke & Doutt and *Himopolynema* Taguchi for the first time from India. These were followed by description of a species of *Polynema* by Hayat & Singh (2001), and three species of *Himopolynema* by Hayat *et al.* (2003). In 2003, Narendran *et al.*, recorded the genus *Australomymar* Girault from India and described one species. Rehmat *et al.* (2009) recorded the genus *Litus*

Haliday from India and described two species; and Hayat & F. R. Khan (2009) recorded the genus *Eubroncus* Yoshimoto, Kozlov & Trajapitzin from India and described one new species.

Manickavasagam & Rameshkumar (2011) reported three genera and described one new species of *Dicopus* Enock from India. Manickavasagam, *et al.* (2011) provide distribution of *Omyomymar* Schauff and key to Indian species of *Camptoptera* Foerster, *Erythmelus* Enock, *Mymar* and *Palaeoneura* Waterhouse; Rehmat & Anis (2011), recorded another genus *Pseudanaphes* Noyes & Valentine from India and described one new species. Some considerable publications after 2012 as follows: Manickavasagam & Rameshkumar (2012 a, b), described mymarid parasitoid and recorded *Callodicopus* Ogloblin and some mymarids from Andaman and Nichobar Islands; Zeya & Khan (2012) described two new species and provide key to 13 species of *ater*-group of *Gonatocerus*; Anwar & Zeya (2012) provide new records of some species of Mymaridae from different Indian states.

Zeya & Anwar (2013) described four new species of *Gonatocerus* from India. An updated checklist for Indian species of Mymaridae provided by Anis & Rehmat (2013); in the same year another checklist was given by Manickavasagam & Rameshkumar (2013). Manickavasagam & Palanivel (2013) reported two mymarid genera, *Cleruchus* Enock and *Kikiki* Huber & Beardsley, from India. Review of the genus *Alaptus* from India was given by Anwar & Zeya (2014) along with three new species. Rehmat & Anis (2014a) described one new species of *Alaptus* and one new species and a new record of species in *Camptoptera* from India. Anwar & Zeya (2014) also recorded a new genus *Stephanocampta* from India based on a male. Recently Rehmat & Anis (2014b) recorded a new species of the genus *Schizophragma* Haliday from India.

MATERIAL AND METHODS

1. Material

The present study is based on large number of mymarid specimens collected mainly during the last six years from the northern, nort-eastern and some southern States of India. In addition, the author has also examined types and several hundred specimens of determined and undetermined species present in the ZDAMU collections.

Digital images of few Types of some species from Natural History Museum were also studied for species identification.

2. Methodology

Collection

Mymarid specimens were mostly collected by a **sweep net**. The insects collected in the net were sucked in an aspirator and killed in ethyl acetate fumes. Some specimens were directly transferred from the net to 80% ethyl alcohol.

Yellow Pan trapping has proved to be a good method of catching mymarids, mainly of very minute size. The trap consists of a tray about 30 cm square and 5–8 cm deep, painted yellow on the inside. Insects are attracted to the yellow colour and drown in the collecting medium contained in the pan. The collecting medium is water with a few drops of a detergent to break the surface tension, or a dilute solution of picric acid, or a saturated solution of common salt. Material was collected daily to avoid the deterioration of insects. Specimens then transferred to 80% ethyl alcohol.

Another method that proved to be useful in collecting mymarids is **light trapping**. This was done by the help of a light trap fitted with yellow light. Minute size specimens were easily collected by this method. Collected specimens were directly transferd to 80% ethyl alcohol.

For detail study and for correct identification of these small sized specimens, it is necessary to mount them on cards and on slides. It is almost impossible to identify the specimens to their correct species if the specimens are preserved in alcohol.

Preparation of card mounts

The procedure given by Noyes (1982) was adopted for card mounting of specimens. The procedure mainly consist of attaching the specimen via thorax on a rectangular card (14x 5mm) using any water soluble glue. Care was taken to see that the antennae, wings and legs are free, and the body is attached through the pleural region of the thorax.

Preparation of slide mounts

The procedure given by Noyes (1982) is adopted for slide preparation. Noyes (1982) method for slide preparation was preferred here over other methods as it has double advantage of clearing the specimens so as to make it possible to see all details of setation and sculpture, and internal structures like the ovipositor.

Depending on the number of specimen available, one to several slides were prepared for each species. However, when only a single specimen of a species was available this was dissected and mounted on a slide after body colour and other details has been recorded.

Briefly stated this procedure consists of the following steps. It should be noted that the specimens should be on card.

1. Wings were removed with the help of a fine needle and placed in a small drop of Canada balsam as shown in Figure 1.
2. Antennae were knocked off and attached to the side of the thorax with a small quantity of Canada balsam. The head was knocked off and attached to thorax with a small quantity of Canada balsam.
3. The specimen was transferred to a small quantity of 10% KOH. In a short time the specimens frees from the card and sinks to the bottom of the cavity block. It is kept in KOH for 48 hours at room temperature. If the specimen is to be processed quickly then the block is placed in thermostat at 95–98 $^{\circ}$C for 10 minutes.
4. After 48 hours (or 10 minutes at 95–98° C), the KOH is pipitted off, and the specimens was passed through (for 10 minutes each) glacial acetic acid, distilled water and equal amount of distilled water and 80% alcohol. Then the specimen was dehydrated in ascending grades of alcohol (80%,

90%, 96%, absolute alcohol) for 10 minutes in each grade. Then the specimen was passed through a mixture of absolute alcohol and oil of cloves, and finally cleared in oils of cloves.

5. The specimen is then removed from oil of cloves and various parts arranged on slide as shown in Figure. 1.
6. The slide is allowed to dry for about two weeks, and then coverslips were placed on the parts. The slide is then allowed to dry for another two weeks in a thermostat at 40° C.

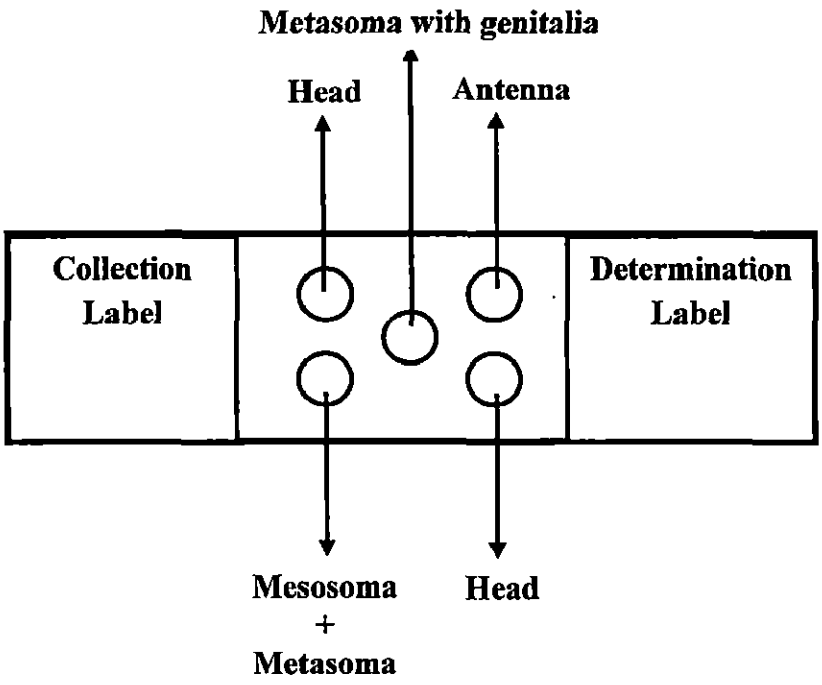


Figure 1. Arrangement of body parts mounted on slide

Photography

Photographs were taken from slide mounted parts. Multiple images at different focal planes were taken with the help of a high-resolution digital camera (Leica DFC295) mounted on a compound microscope (Leica, DM2500). These images were combined with Auto Montage® System; the photographs were then enhanced where necessary using Adobe Photoshop.

Drawings

Drawings of various structures were made from slide preparations with the help of a drawing tube attached to a compound binocular microscope (Nikon eclipse 80i).

Measurements

Absolute measurements in millimeters are given only for body lengths taken from the slide preparations. All other are relative measurements of various body parts were also taken from the slide preparations with the help of an ocular micrometer having a linear scale of 100 divisions, placed in the eye piece of a compound microscope (Nikon eclipse E200). These measurements were made at 400x magnification.

Measurements of various parts from the card mount with the help of a calibrated linear scale of an ocular micrometer, placed in the eye piece of a compound binocular microscope (Nikon eclipse E200).

TERMINOLOGY

The terminology used in the present work for various body parts is evident from Figures 2–10. However, the antennal formula used in describing the number of antennal segments need to be explained. For mymarids, the formula consists of 5 numerals. The first and the second numerals refer to the scape and the pedicel and are always '1', whereas the number varies with the funicle segments and the clava. For example, antennal formula, '1161' indicates that the antenna is composed of a scape, a pedicel, a 6-segmented funicle and a 1-segmented or solid clava.

ABBREVIATIONS

1. Acronyms for Museums and Depositories

BMNH = The Natural History Museum, London, United Kindom.

BPBM = Bernice Pauahi Bishop Museum, Honolulu, Hawaii, U.S.A.United Kingdom.

EDAU = Parasitoid Taxonomy and Biocontrol Laboratory, Entomology, Department, Annamalai University, Chidambaram, Tamil Nadu, India.

ELEU = Entomology Laboratory, Ehime University, Matsuyama, Japan.

ELNJ = Entomology Laboratory, Faculty of Agriculture, Meijo, University, Nagoya, Japan.

FRI = Entomology Museum, Forest Research Institute, Dehra dun, India.

DEZP = Departimento di Entomologia e Zoologia Agraria, Università di Napoli, Portici, Italy.

MLP = Museo de La Plata, La Plata, Argentina.

MNHG = Muséum d'Histoire Naturelle, Geneva, Switzerland.

NHMV = Naturhistorisches Museum, Vienna, Austria.

NPC = National Pusa Collections, Divisions of Entomology, Indian Agriculture Research Institute, New Delhi, India.

PPRI = Plant Protection Research Institute, Pretoria, South

Africa.

QMB = Queensland Museum, Brisbane, Australia.

USNM = United States National Museum of Natural History, Washington D.C., U.S.A.

ZDAMU = Insect Collection, Department of Zoology, Aligarh Muslim University, Aligarh, India.

ZISP = Zoological Institute, St Petersburg, Russia.

ZSI = Zoological Survey of India, Kolkata, India.

2. General Abbreviations

Fig. = Figure

syn. nov. = A new synonym proposed in this work.

comb. nov. = A new combination; first transfer of a species to a genus other than the one in which it was originally placed.

YPT = Yellow Pan Trap

LT = Light Trap

MT = Malaise Trap

3. Abbreviations for terms and measurements

The following abbreviations for various body parts were used in the text:

Head

HW = Maximum width of head in front view.

HL = Height of head from top of head to mouth margin.

FVW = Minimum width of frontovertex in front view of head.

POL = Distance between posterior ocelli.

DBT = Distance between toruli.

MDL = Length of mandibles.

TMMD = Distance between torulus and mouth margin.

TL = Maximum diameter of torulus.

EH = Maximum eye height, measured with the head in front view.

MSL = Malar space length. It is minimum distance from lower eye margin to mouth margin.

Antenna

SCL = Length of scape.

SCW = Width of scape.

PL = Length of pedicel.

PW = Width of pedicel.

FnL = Length of funicle.

F1–7L = Length of funiclular segments (1–7).

F1–7W = Width of funiclular segments (1–7).

CLL = Length of clava.

CLW = Width of clava.

Mesosoma

PNL = Pronotum length.

MESL = Length of mesosoma measured along midline from anterior margin of pronotum to posterior margin of propodeum.

MESW = Width of mesosoma measured along propodeum.

MSCL = Length of mid lobe of mesoscutum, measured along midline from anterior margin to posterior margin.

MSCW = Width of mid lobe of mesoscutum.

SCTL = Length of scutellum, measured along midline from anterior margin of anterior scutellum to posterior margin of posterior scutellum.

SCTW = Width of scutellum.

MTANL = Metanotum length.

Meso.PL = Length of mesophragma.

PDL = Length of propodeum, measured along midline in dorsal view.

Wings

FWL = Fore wing length, measured from base to apex.

FWW = Fore wing width, measured across the widest part of disc.

FFL = Length of marginal fringe of fore wing; the longest cilium/cilia of the marginal fringe along posterior margin of the disc.

HWL = Hind wing length.

HWW = Hind wing width, measured across the widest part, which is usually half way between hamuli and apex of disc.

HFL = Length of marginal fringe of hind wing; the longest cilium/cilia of the fringe along posterior margin of disc.

FFm = Length of fore femur, excluding trochantellus.

FTb = Total length of fore tibia.

FTrs = Length of fore tarsus.

FBstr = Maximum length of fore basitarsus.

FT4 = Foretarsus segment length.

MFm = Length of mid femur excluding trochantellus.

MTb = Total length of mid tibia.

MTrs = Length of mid tarsus.

MBstr = Maximum length of hind tibia.

HCL = Length of hind coxa.

HFm = Length of hind femur excluding trochantellus.

HTb = Total length of hind tibia.

HTrs = Length of hind tarsus.

HBstr = Maximum length of hind basitarsus.

Trs = Tarsal segments.

Metasoma

PETL = Petiole length.

METL = Length of gaster, measured from base of TI to apex of last tergite.

METW = Maximum width of gaster.

OVL = Length of ovipositor, measured from the base of second valvifer to the apex of third valvula.

Ext. OVL = Length of exserted part of ovipositor.

TI-TVII = Tergites 1–7 of gaster.

Family MYMARIDAE Haliday

Mymares Haliday, 1833: 1(4): 341. Valid tribe of Chalcides, Type genus: *Mymar* Curtis.

Mymarides Haliday, 1833: Westwood, J.O. (1839): 49–80. Subfamily of Proctotrypidae.

Mymarinae Haliday, 1833: Ashmead, W.H. (1904): 1(4): i–xi, 225–551. Subfamily of Mymaridae Haliday.

Mymarini Haliday, 1833: Ashmead, W.H. (1904): 1(4): i-xi, 225-551. Valid tribe of Mymarinae Haliday. Viggiani, G. (1988): 45:141–148. Valid tribe of Mymarinae Haliday.

Mymaroidae Haliday, 1833: Förster, A. (1856):152.

Mymaridae Haliday, 1833: I-IV. Family of Terebellifera. Ashmead, W.H. (1899): 4: 235–242. Ashmead, W.H. (1904): 225–551, 39. Girault, A.A. (1912): 1: 117–175. Girault, A.A. (1913): 2:107–129. Girault, A.A. (1915): 3:154–169. Subba Rao, B.R.; Hayat, M. (1983): 20:125–150. Schauff, M.E. (1984): 12:1–67. Viggiani, G. (1988a): 45:141–148. Noyes, J.S.; Valentine, E.W. (1989):17: 1–95. Yoshimoto, C.M. (1990):7: 1–166 (Family of Chalcidoidea Latreille).

Diagnosis.

Minute to small sized chalcids, usually, 0.13–1.5mm. Body generally non-metallic to metallic and yellowish to black in colour. Head with 'H-shaped' trabeculae or carinae below anterior ocellus and along inner eye margins (Fig. 2). Mandibles generally 3-segmented. Antennal toruli widely separated, much closer to eye margin and situated high on the head. Female antennal funicle 6 or 7-segmented, clava solid to 3-segmented (Fig. 2). Males generally have 11-segmented flagellum (Fig. 4). Pronotum undivided to divided, mesoscutum with complete to incomplete notauli, scutellum normally divided into anterior and posterior parts (Fig. 8). Both fore wing and hind wing have long marginal fringe (Figs 5 & 7). Hind wing petiolate, discal membrane not extending to the base of the wing (Fig. 7). Tarsi 4 or 5-segmented (Figs 9 & 10). Sexual dimorphism is mainly in antennal segments and genitalia.

Classification

The classification of the family Mymaridae is as yet an unresolved problem as whatever has been published in recent years (for example, Schauff, 1984) does not take into account all the known world genera.

Basically there are two systems of classifying Mymaridae into subfamilies and tribes. One in which the family was divided into two subfamilies based on the number of tarsal segments (Ashmead, 1904): pentamerous Gonatocerinae and tetramerous Mymarinae. Further, each one of these subfamilies was divided into two tribes based on a sessile gaster (petiole broadly attached to gaster so that the mesopostphragma clearly project into gaster), and petiolate gaster (petiole narrow, sometimes tubular, so that the mesopostphragma reaches at most to apex of the propodeum).

Girault (1929), on the other hand, divided Mymaridae into two subfamilies, Alaptinae and Mymarinae, on the basis of the sessile or petiolate gaster. Each one of these subfamilies was further divided into two tribes based on the pentamerous or tetramerous tarsi; pentamerous Alaptini and tetramerous Anagrini (in Alaptinae), and pentamerous Ooctonini and tetramerous Mymarini (in Mymarinae). Annecke and Doutt (1961) added one more tribe, Anaphini, to the Mymarinae.

Yoshimoto, Kozlov & Trjapitzin (1972) proposed the subfamily Eubroncinae.

There are some publications, which are now only of historical value, which considered mymarids in a superfamily or elevate some subfamilies to family ranks. For instance, Ghesquière (1942) elevated mymarids to superfamily, Mymaroidea, and included the families Mymaridae, Lymaenonidae and Signiphoridae. The later is now regarded as a family related to the Aphelinidae. Soyka (1949) elevated Alaptinae to Alaptidae. Debauche (1948) placed the genus *Mymaromma* Girault in a separate family, Mymarommidae (correct name, Mymarommatidae), which is accepted by later authors, but is presently placed in a separate superfamily Mymarommatoidea.

Schauff's (1984) phylogenetic (cladistic) analysis of the Holoarctic genera lead him to abandon divisions of Mymaridae into subfamilies and placed the genera into generic-groups. This approach was adapted by Noyes & Valentine (1989) and more recently in a review of the Australian genera by Lin *et al.* (2007).

The 32 Indian genera are grouped into the following generic groups. Brief diagnosis in each species group is given by Lin *et al.* (2007), and therefore the present author refrains from reproducing the diagnosis given by these authors:

Genera with 5-segmented tarsi:

Gonatocerus group – Indian genus: *Gonatocerus*

Ooctonus group – Indian genus: *Ooctonus*

Arescon group – Indian genus: *Arescon*

Camptoptera group – Indian genera: *Camptoptera, Camptopteroides, Eofoersteria, Ptilomymar, Stephnocampta*

Alaptus group – Indian genera: *Alaptus, Callodicopus, Dicopus, Dicopomorpha, Kikiki, Litus*

Genera with 4- segmented tarsi:

Anagroidea group – Indian genera: *Anagroidea, Eubronchus*

Cleruchus group – Indian genera: *Cleruchus*

Polynema group – Indian genera: *Acmopolynema, Himopolynema, Mymar, Narayanella, Palaeoneura, Polynema, Stephanodes.*

Anagrus group – Indian genera: *Anagrus, Omyomymar, Stethynium, Schizophragma*

Anaphes group – Indian genera: *Anaphes, Erythmelus, Pseudanaphes*

Australomymar group – Indian genus: *Australomymar*

NOTES ON KEYS TO GENERA AND SPECIES

Characters used in the keys are generally external morphological which can be seen in slide mounts under lower magnification. Characters specific to genera and non-contrasting characters are given in parenthesis (). The figures illustrating the given characters of the key couplet are mostly from present work but sometimes some are adopted from published works of other authors as well. Key to females and males (combined) are provided, for those genera where males are known.

KEY TO INDIAN GENERA OF FAMILY MYMARIDAE (FEMALES)

1. Tarsi 5-segmented, tarsal formula 5–5–5 (Fig. 10) 2

-. Tarsi 4-segmented, tarsal formula 4–4–4 (Fig. 9) or, tarsi 3-segmented [clava 2-segmented (Huber & Noyes, 2013; Fig. 37) ***Kikiki*** Huber & Beardsley]..... 11

2. Gaster sessile or subsessile; mesophragma plainly projecting into gaster (Fig. 68) 3

-. Gaster distinctly petiolate (petiole of variable length); mesophragma not projecting into gaster (Figs 28, 138 & 295) 7

3. Fore wing oar-shaped, with posterior margin evenly curved medially (Lin *et al.*, 2007; Fig. 101) ..... ***Dicopus*** Enock

-. Fore wing narrow and almost parallel sided at base (Fig. 57) 4

4. Funicle 5-segmented; hind margin of fore wing excised at apex of retinaculum (Fig. 57) (scutellum and postscutellum not strongly sculptured) ..... ***Alaptus*** Westwood

-. Funicle 6– or 7-segmented; hind margin of fore wing convexly rounded, not excised (Fig. 256) 5

5. Funicle 6-segmented (Fig. 255) (clava 1–2 segmented) ..... ***Litus*** Haliday

-. Funicle 7-segmented (Lin *et al.*, 2007; Fig. 9) 6

6. Fore wing narrow and elongate, anterior and posterior margin parallel with 3 rows of discal setae (Yoshimoto, 1990; Fig. 65) ..... ***Callodicopus*** Ogloblin

-. Fore wing elongately spatulate with two rows of discal setae (Lin *et al.*, 2007; Fig. 92) ..... ***Dicopomorpha*** Ogloblin

7. Funicle 8-segmented (Lin *et al.*, 2007; Figs 138, 144) 8

-. Funicle at most 5 or 7-segmented (Fig. 82, 163) 9

8. Head with sub-antennal groove between torulus and mouth margin usually present (Zeya & Hayat, 1995; Fig. 25); propodeum smooth or with longitudinal submedian carinae; hypochaeta of marginal vein located mid way between proximal and distal macrochaeta ..... ***Gonatocerus*** Nees

-. Head without sub-antennal groove (Zeya & Hayat, 1995; Fig. 182); propodeum with carinae; hypochaeta much closer to proximal macrochaeta than to distal macrochaeta ..... ***Ooctonus*** Haliday

9. Funicle 5-segmented (Fig. 76), clava solid with 1–3 segments; fore wing relatively broad; marginal vein greatly elongated, the venation reaching to more than half the length of the wing (Fig. 77) ..... ***Arescon*** Walker

-. Funicle 7-segmented (Fig. 96), (majority of the species have F2 ring like, likely to be overlooked); fore wing narrow and distinctly curved at apex; marginal vein short, venation not extending beyond basal third of wing (Fig. 97) 10

10. Fore wing without dark areas contrasting with hyaline areas, and slightly but distinctly curved apically, the posterior margin slightly concave, especially towards apex, and apex rounded (Fig. 108); mandible apparently with one tooth; head and mesosoma with faint reticulate sculpture and setae short, inconspicuous in lateral view ..... ***Camptoptera*** Foerster

-. Fore wing with dark areas, and not curved apically, the posterior margin straight or slightly convex (strongly so in short-winged species) and its apex pointed (Lin *et al.*, 2007; Fig. 71) mandible with two equal sized teeth; head and mesosoma with heavy, reticulate sculpture and setae longer, conspicuous in lateral view .....***Camptopteroides*** Viggiani

11. Funicle 8-segmented; propodeum with a pair of submedian, translucent areolate carinae (Lin *et al.*, 2007; Fig. 233); tergum I of gaster with lateral or sublateral pair of translucent, areolate carinae ..... ***Ptilomymar*** Annecke & Doutt

-. Funicle at most 6-segmented; propodeum and gaster without such carinae 12

12. Fore wing parallel-sided or knife like; femur slightly swaollen (Lin *et al.*, 2007; Fig. 84) ..... ***Cleruchus*** Enock

-. Fore wing not parallel-sided or knife-like; femur not swollen (Fig. 383) 13

13. Scutellum usually divided into anterior and posterior parts (Fig. 383) 14

-. Scutellum not clearly divided into anterior and posterior parts (Fig. 172) 22

14. Posterior scutellum divided longitudinally by a suture 15

-. Posterior scutellum entire, not divided longitudinally by a suture 18

15. Antennal clava solid (Lin *et al.*, 2007; Fig. 31) ..... ***Anagrus*** Haliday

-. Antennal clava 2–3-segmented, the sutures strongly oblique 16

16. Antennal clava 2-segmented (Fig. 367); ovipositor forming a large loop towards anterior part of gaster (Fig. 371) 17

-. Antennal clava 3-segmented (Fig. 379); ovipositor exserted, simple without any loop (Fig. 383) ..... ***Stethynium*** Enock

17. Apical segment of clava not produced into digit (Fig. 367); mesophragma deeply notched posteriorly (Fig. 370) ..... ***Schizophragma*** Ogloblin

-. Apical segment of clava produced into digit (Lin & Chiappini, 1996; Fig. 3); mesophragma not notched ..... ***Omyomymar*** Schauff

18. Clava solid (Fig. 190) 19

-. Clava 2- or 3- segmented (Figs 360 & 379)..... 21

19. Fore wing venation reaching at least to half the length of the wing (as in *Arescon*); ovipositor distinctly exserted, often as long as or longer than gaster (Narendran *et al.*, 2003; Fig. 1) ..... ***Australomymar*** Girault

-. Fore wing venation not more than one-third the length of wing; ovipositor variable (Figs 184, 194 & 197) 20

20. Hypopygium short, not extending to apex of gaster (Huber, 2004; Fig. 48); head in lateral view relatively thick, the gena relatively wide so that the posterior margin of eye separated along entire length from back of head; mandibles normal, crossing medially and with three teeth; body usually black or dark brow (see also couplet-22) ..... ***Anaphes*** Haliday

-. Hypopygium well developed, extending almost to apex of gaster (Fig. 207); head in lateral view thin, the gena very narrow so that the posterior margin of eye, at least dorsally, touching back of head; mandibles minute, not meeting medially and apparently without teeth; body usually yellow or light brown .... ***Erythmelus*** Enock

21. Clava 2-segmented (Fig. 203) (see also couplet-21) ..... ***Anaphes*** Haliday

-. Clava 3-segmented (Fig. 360) (Fore wing relatively long with a curved dark infuscate band below venation and marginal fringe) .... ***Pseudanaphes*** Noyes & Valentine

22. Body minute (about 0.3mm); fore wing very narrow, slightly but distinctly curved at apex as in *Camptoptera* (Fig. 170) (Mandible with one tooth) ..... ***Eofoersteria*** Mathot

-. Body longer (usually more than 0.5mm); fore wing usually broader and not curved at apex 23

23. Mandibles pointed ventrally, not crossing each other medially; hind wing relatively broad with rounded apex (Lin *et al.*, 2007; Fig. 26) 24

-. Mandible normally articulated, crossing each other medially; hind wing with relatively narrow apex (Fig. 239) 25

24. Head in lateral view only slightly triangular, not longer than high with small projection between toruli (Lin *et al.*, 2007; Fig. 23); mandible not longer than width of mouth opening (Lin *et al.*, 2007; Fig. 26); antenna double geniculate and first funicle segment longer than any other segment and about as long as pedicel ..... ***Anagroidea*** Girault

-. Head in lateral view strongly and sharply triangular (Lin *et al.*, 2007; Fig. 126), much longer than high and with large, distinct shelf projecting between toruli (Lin *et al.*, 2007; Fig. 124); mandible at least as long as width of mouth opening; antenna not double geniculate and first funicle segment shortest of all segments and shorter than pedicel ..... ***Eubroncus*** Yoshimoto, Kozlov & Trjapitzin

25. Fore wing very narrow, oar-shaped, with a long narrow petiolate basal half or more, and short, oval, partly infuscate blade (Hayat *et al.*, 2008; Fig. 9); hind wing filamentous (Hayat *et al.*, 2008; Fig. 10); antennal scape constricted medially..... ***Mymar*** Curtis

-. Fore wing not oar-shaped; hind wing not filamentous (Fig. 239) (sometimes membrane very narrow); antennal scape not constricted medially 26

26. Discal setae on fore wing arranged in curved and alternating strong and weak rows; hind leg with very long spine-like setae (Subba Rao, 1976; Fig. 2); last segment of funicle like a segment of clava ..... ***Narayanella*** Subba Rao

-. Fore wing with discal setae not arranged in curved rows (Fig. 238); hind leg with normal setae; last segment of funicle not like a segment of clava 27

27. Petiole attached to gastral tergum (Fig. 303) 28

-. Petiole attached to gastral sternum (Fig. 225) 30

28. Face with small pit submedially next to each torulus (Fig. 220); propodeum with a mid-longitudinal furrow or canal (Fig. 241) ..... ***Himopolynema*** Taguchi

-. Face without a pit next to each torulus (Fig. 11); propodeum without such a furrow or canal (Fig. 28) 29

29. Fore wing usually narrow and often slightly narrower beyond venation (Fig. 281), propodeum smooth, without carinae (Fig. 282); pro- and mesothorax with enlarged and blunt or cuspidate setae ..... ***Palaeoneura*** Waterhouse

-. Fore wing usually wider just beyond apex of venation (Fig. 327); propodeum with at least an incomplete median carinae (Fig. 328); pro- and mesothoracic setae usually normal, neither blunt nor cuspidate at apices .... ***Polynema*** Haliday

30. Antennal scape with imbricate, rasp-like sculpture on inner surface (Fig. 373); vertex with a wide, shallow depression outside each ocellus (Fig. 372); prothoracic spiracles placed near anterior apex of notauli; propodeum without carinae (Fig. 377) ..... ***Staphanodes*** Enock

-. Antennal scape without imbricate, rasp-like sculpture but with cross-ridges on inner surface (Fig. 26); vertex without such depressions outside each ocellus; prothoracic spiracles, as usual, at postero-lateral angle of pronotum; propodeum with a median V-shaped carina (Fig. 38) ..... ***Acmopolynema*** Ogloblin

1. Genus *Acmopolynema* Ogloblin

(Figures 11–51)

Acmopolynema Ogloblin, 1946: 286. Type species *Stichothrix bifasciatipennis* Girault, by original designation.

Grangeriella Soyka, 1956: 17. Type species *Grangeriella indochinensis* Soyka, by monotypy and original designation. Synonymized by Hayat & Anis, 1999b: 297.

Neonarayanella Husain & Farooqi, 1996: 83. Type species *Maidliella orientalis* Narayanan, Subba Rao & Kaur, by monotypy and original designation. Synonymized by Hayat & Anis, 1999b: 297.

Baburia Hedqvist 2004: 235. Type species *Baburia narendrani* Hedqvist, by original designation. Synonymized by Triapitsyn & Berezovskiy, 2007: 6.

References: Hayat & Anis, 1999b, review of Indian species. Triapitsyn & Berezovskiy, 2007, review of Oriental and Australasian species. Berezovskiy & Triapitsyn, 2001, review of species from Primorskii krai. Xu & Lin, 2002, Chinese species.

Diagnosis

Female. Body length usually, 0.7–2.0 mm. Face without pits next to each torulus (Fig. 11); torulus located mostly above mid level of eye. Mandible tridentate (Fig. 35). Antenna 9-segmented, formula 1161 (Fig. 26); longitudinal sensillum absent on funicle segments except F6 with 1 or 2 longitudinal sensilla; clava entire with usually 7–9 longitudinal sensilla (Fig. 36). Pronotum not divided mediolongitudinally but a middle ridge is present on pronotal collar; propleura abutting each other anteriorly along midline; mesoscutum with distinct notauli; axillar seta of various length and sometimes with several fovea; scutellum with or without a row of frenal foveae, scutellar sensilla close to or usually at anterior margin of scutellum; propodeum with incomplete or complete V-shaped submedial carinae (Fig. 38). Fore wing with one dorsal macrocheta, one short macrocheta, one short ventral seta at apex on marginal vein; disc with variable chaetotaxy, hyaline or

infuscated (evenly or unevenly) or spotted or banded; discal setae of varying types [modified setae F and G types (Schauff, 1981)]; hind wing with disc mostly hyaline. Tarsal formula, 4–4–4; hind coxa and hind femur sometimes reticulated. Petiole usually cylindrical, attached to gastral sternum; ovipositor short to long, usually exserted beyond apex of gaster.

Colour. Body mostly yellow to light brown to dark brown. Antennal segments from white to dark brown. Legs usually yellow to light brown.

Male. Similar to female except funicle 11-segmented. Genitalia elongated, digiti without hooks, usually straight and long, rarely short (Fig. 16).

Hosts. Unknown.

Distribution: Cosmopolitan.

Species. World, 57 (Noyes, 2015); India, 9 species (including one new record).

Comments. The genus is distinguished from genera of the group mainly by the presence of a V-shaped carina on the propodeum, modified discal setae on the wings and relatively longer distal veins; absence of pits between toruli and petiole attached to gastral sternum.

Key to Indian species of *Acmopolynema* (females)

1. Fore wing with one or two small infuscated patches in apical third (Fig. 13); discal setae in middle third just distad of venation, transparent and fine 2

-. Fore wing not with one or two small infuscated patches in apical third, either with one large patch in apical third or with infuscation in middle third, or more usually both (Figs 37, 42), discal setae dark and thick 4

2. Fore wing in apical third sparsely though evenly setose, without a distinct bare area (Fig. 13); scape about 2.3x as long as broad; ovipositor 2.0x as long as hind tibia ..... 1. *indochinense* (Soyka)

-. Fore wing in apical third sparsely setose and with a distinct bare area just anterior to the smaller infuscated patch (Fig. 18); scape about 2.0x as long as broad; ovipositor about 1.1–1.9x as long as hind tibia 3

3. Fore wing disc with two infuscated spots, one opposite the other, posterior spot smaller (Fig. 18); fore wing about 3.76–4.2x as long as broad .... 2. *bimaculatum* Subba Rao

-. Fore wing disc with one infuscated spot distally (Fig. 27), fore wing elongated, 4.4x as long as broad ..... 3. *shrawastianum* Hayat & Anis

4. Fore wing with a central infuscated patch (Fig. 31) 5

-. Fore wing with at least two infuscated patches (Fig. 42), one in about the middle and the other towards apical fourth or so 6

5. Scape with cross-ridges on inner surface; F6 nearly as dark as clava (Fig. 30) ..... 4. *incognitum* (Narayanan, Subba Rao & Kaur)

-. Scape smooth, F6 white (Fig. 36) ..... 5. *problema* Triapitsyn & Berezovskiy

6. Fore wing disc with a relatively narrow (occupying about 1/8 wing length), distal brown band extending to wing apex (Triapitsyn & Berezovskiy, 2007; Fig. 3) ..... 6. *tachikawai* Taguchi

-. Fore wing disc with a relatively broad, distal brown band not extending to wing apex 7

7. Fore wing with infuscation in middle and with an infuscated patch in apical third and fore wing disc with 3–4 setal tracts (Fig. 42); body more or less completely golden to pale orange to brownish yellow 8

-. Fore wing without infuscation in middle, but with a nearly circular infuscated patch in apical third (Subba Rao, 1989; Fig. 3); body, except pronotum, petiole and last two terga of gaster, dark brown .....7. *malabaricum* Subba Rao

8. Propodeum with a medial groove extending from anterior margin to base of the submedial carinae at posterior margin (Fig. 43); propodeal submedial carinae very short, not reaching half length of the propodeum .... 8. *campylurum* Xu & Lin

-. Propodeum without a medial groove (Fig. 50); propodeal submedial carinae wide submedial carinae reaching or almost reaching its anterior margin

..... 9. *orientale* (Narayanan, Subba Rao & Kaur)

1. *Acmopolynema indochinense* (Soyka)

(Figures 11–15)

Grangeriella indochinensis Soyka, 1956: 18, Female. Vietnam, Ho Chi Minh City (Saigon) (NHMV, not examined).

Acmopolynema indochinense (Soyka): Hayat & Anis, 1999b: 298. Triapitsyn & Berezovskiy, 2007: 22, Female, redescription; Male, description from Thailand, records.

Acmopolynema himalum Hayat & Anis, 1999b: 300–301, Female. India, Uttarakhand, Mussoorie. Synonymized by Triapitsyn & Berezovskiy, 2007:22.

Acmopolynema himalum Hayat & Binte [sic]: Xu & Lin, 2002: 148–149.

Acmopolynema bimaculata Subba Rao: Hayat, 1992: 84, Female. India, Mussoorie (Misidentification according to Hayat & Anis, 1999: 300, and described as *Acmopolynema himalum*).

Acmopolynema indochinense (Soyka): Anis & Rehmat, 2013: 2, checklist. Manickavasagam &Rameshkumar, 2013: 562, checklist.

Diagnosis

Female. Body length 0.76 mm. Antennal scape (Fig. 12) with cross ridges, 2.3x as long as wide; pedicel slightly shorter than F1; F1 subequal in length by F4; F2 longest of all funicle segments; F3 slightly shorter than F2; clava 2.5 x as long as wide and about equal to length of 3 preceding segments combined as in fig. 12. Scutellum without any frenal fovea. Fore wing (Fig. 13) with disc hyaline except two subapical dark spots, discal setae sparsely arranged with modified setae of F, G and H, more densly setose in distal half of the wing disc. Mesosoma (Fig. 14) with very short V-shaped carinae on the propodeum. Metasoma with prominently

exsereted ovipositor; exserted ovipositor 4.1x of total ovipositor length as in fig. 15, ratio between ovipositor length and hind tibia length 2.08: 1.

Colour. Body yellow to dark brown. Head, mesosoma, procoxa, protrochanter, basal half of profemur, and gaster dark brown; clava, wing venation, distal half of mesofemur, and apical segment of all tarsi brown; antenna, remainder of leg segments and petiole yellow to light brown.

Relative measurements (slide): FVW, 60; POL, 38; DBT, 35; EH, 50; SCL, 30; SCW, 13; PL, 20; PW, 11; CLL, 56; CLW, 22; F1L, 21; F1W, 4; F2L, 25; F2W, 4.5; F3L, 22; F3W, 4.5; F4L, 19; F4W, 6; F5L, 16; F5W, 7; F6L, 11; F6W, 9; MESL, 118; MSCL, 37; SCTL, 38; PDL, 15; FWL, 290; FWW, 70; FFL, 55; HWL, 262; HWW, 7; HFL, 40; FFm, 60; FTb, 50, FTrs, 100; FBstr, 34; MFm, 60; MTb, 90; HFm, 70; HTb, 100; HTrs, 108; METL, 178; PETL, 30; OVL, 208; Ext. OVL, 50.

Male. Similar to female except sexual dimorphic characters such as antenna and genitalia; fore wing hyaline and wider than in female, about 3.6x as long as broad (Triapitsyn & Berezovskiy, 2007; Fig. 28).

Material examined: INDIA: KERALA: Kottayam, Kidangoor, 1Female (on slide), 14.i.2012, Coll. F.R. Khan; KARNATAKA: Bengaluru, NBII, 1Female (on slide), 3.iii.2013, Coll. K. Veenakumari.

Host. Unknown.

Distribution. India: Delhi, Karnataka, Kerala **(present record)**, Uttarakhand. (Australia, China, Indonesia, Malaysia, Thailand, Vietnam)

Comments. It is new record from the Indian state of Kerala. *Acmopolynema indochinense* differs from other species of the genus by the characters given in the key.

2. *Acmopolynema bimaculatum* Subba Rao

(Figures 16–23)

Acmopolynema bimaculata Subba Rao, 1989: 158, Female. India, Kerela, Periyar Animal Sanctuary (BMNH, not examined).

Acmopolynema bimaculatum Subba Rao: Hayat & Anis 1999: 301–303, Female, Male, diagnosis, figures. Triapitsyn & Berezovskiy, 2007: 22–23, diagnosis, figures, records. Anis & Rehmat, 2013: 2, checklist. Manickavasagam & Rameshkumar, 2013: 562, checklist.

Diagnosis

Female. Body length, 0.72 mm. Antennal scape (Fig. 17) 2.0 x as long as broad; pedicel subequal to F1 in length, F2 and F3, F4-F6 sub equal in length. Pronotum undivided, absence of frenal fovea on the scutellum, propodeum with short V-shaped carinae as in fig. 20. Fore wing (Fig. 18) 4.2x as long as broad with two infuscated spots in apical third (sparsely setose) and disc with distinctly bare area (anterior to small infuscated patch). Exserted ovipositor (Fig. 21) 0.05x of gaster length; ovipositor length: hind tibia length 1.1:1.

Colour. Body colour brown to dark brown, dorsal margin and basal half of scape, dorsal margin of pedicel, F1-F4 pale brown except F5 and F6 white; clava dark brown. Fore wing (Fig. 18) with two infuscated spots, discal setae in about middle half transparent; hind wing slightly infuscated distally. Legs including all coxae brownish except apical fore femur and tibia, basal two-fifth of mid tibia and basal half of hind tibia, all tarsal segments except last, white.

Relative measurements (slide): DBT, 35; EH, 50; SCL, 25; SCW, 12; PL, 20; PW, 12; CLL, 52; CLW, 18; F1L, 18; F1W, 4; F2L, 23; F2W, 5; F3L, 22; F3W, 5; F4L, 15; F4W, 5; F5L, 15; F5W, 7; F6L, 15; F6W, 9; MESL, 110; MSCL, 36; SCTL, 60; PDL, 23; FWL, 275; FWW, 65; FFL, 63; FFm, 60; FTb, 60; FTrs, 85; MFm, 60; MTb, 75; MTrs 100; HFm, 90; HTb, 95; HTrs, 110; METL, 160; PETL, 30; OVL, 110; Ext. OVL, 6.

Male. Similar to female except for normal sexually dimorphic characters such as antenna and genitalia. Scape brownish except pedicel and F1 brown (Fig. 16); fore

wing hyaline, discal sete dark brown as in Fig. 22. Apex of gaster broadly rounded, narrow at base and gradually expanded to distal fourth. Genitalia as in fig. 23.

Determined material examined. INDIA: KERALA: Trichur, Pecchi, 1Female (on slide), 28.iii.1993, Coll. S. B. Zeya; KARNATAKA: Mysore, Brindavan Garden, 1Male (on slide) 7.iii.1993, Coll. S. B. Zeya (All determined by M. Hayat as *Acmopolynema bimaculatum*).

Host. Unknown.

Distribution: India: Karnataka, Kerala. (Indonesia, Taiwan)

Comments. *Acmpopolynema bimaculatum* appears close to *Acmopolynema indochinense*, by having two small infuscated patches on fore wing in apical third, the small patch adjacent to posterior margin faint; axillar setae relatively longer than *A. indochinense*, antennal scape 2.0x as long as broad with convex or rounded ventral margin and V-shaped carinae on propodeum. It differs from *A. indochinense* by the characters given in the key.

3. *Acmopolynema shrawastianum* Hayat & Anis

(Figures 24–29)

Acmopolynema shrawastianum Hayat & Anis, 2008: 327–333, Female. India, Uttar Pradesh (NPC, not examined).

Acmopolynema shrawastianum Hayat & Anis: Anis & Rehmat, 2013: 2, checklist. Manickavasagam &Rameshkumar, 2013: 562, checklist.

Diagnosis

Female. Body length, 0.76 mm. Antennal scape (Fig. 26) 2x as long as broad, pedicel slightly longer than F1, F2 longest, F3-F6 almost subequal in length. Pronotum undivided, propodeum with short median carinae as in fig. 27. Fore wing (Fig. 27) 4.4x as long broad; marginal fringe 1.1x as long as wing width. Ovipositor (Fig. 29) 1.9x as long as hind tibia; and ovipositor exserted to 0.22x as long as gaster length; ratio of ovipositor length and hind tibia length is 1.9: 1.

Colour. Body dark brown except petiole whitish. Antenna largely brown except distal half of scape dark brown, dorsal margin of pedicel brown; F1 dorsally brown;

F2-F4 brownish; clava dark brown, remaining antenna pale yellow or whitish (Fig. 26). Wings hyaline; fore wing with one infuscated spot on fore wing disc distally adjacent to anterior margin. Legs including coxae, pale yellow; fore femur except apex, dark brown; mid femur, more than half of mid tibia brown; hind femur dark brown; half or more than hind tibia brown; last segments of all tarsai dark brown.

Relative measurements (slide): FVW, 40; POL, 32; DBT, 30; TW, 5; SCL, 22; SCW, 11; PL, 18; PW,13; CLL, 44; CLW, 21; F1L, 15; F1W, 3; F2L, 23; F2W, 4; F3L, 20; F3W, 5; F4L, 17; F4W, 6; F5L, 13; F5W, 6; F6L, 15; F6W, 9; MESL, 108; MSCL, 40; SCTL, 30; PDL, 20; FWL, 278; FWW, 62; FFL, 74; HWL, 250; HWW, 6; HFL, 45; FFm, 55; FTb, 58, FTrs, 80; FBstr, 30; MFm, 50; MTb, 70; MTrs, 90; MBstr, 35; HFm, 55; HTb, 90; HTrs, 100; HBstr, 40; METL, 155; PETL, 33; OVL, 175; Ext. OVL, 35;

Male. Unknown.

Material examined: INDIA: MAHARASHTRA: Kolhapur, Panhala, 1Female (on slide) 23.xi.2012 (YPT), Coll. K. Veenakumari; SIKKIM: Gangtok, Ranka, 1Female (on slide) 14.x.2008, Coll: F.R. Khan.

Host. Unknown.

Distribution. India: Maharashtra **(present record)**, Sikkim **(present record)**, Uttar Pradesh.

Comments. It is a new record from the Indian states of Sikkim and Maharashtra. This species is close to *A. bimaculatum* Subba Rao (two infuscated spot one opposite the other, posterior spot small) but differ by presence of a single infuscated spot on fore wing disc distally and antennal measurements. Specimen examined here by the author also found slight infuscation along posterior margin of fore wing.

4. *Acmopolynema tachikawai* Taguchi

Acmopolynema tachikawai Taguchi, 1971: 54–57, Female. Japan (ZLMU, present depository unknown, apparently lost).

Baburia fasciata Hedqvist, 2004: 236, 239, Female. Sri Lanka, Kataragama (HC). Synonymized by Triapitsyn & Berezovskiy, 2007: 10.

Acmopolynema tachikawai Taguchi: Triapitsyn & Berozovskiy, 2007: 10, Female, recorded from India. Anis & Rehmat, 2013: 2, checklist. Manickavasagam &Rameshkumar, 2013: 562, checklist.

Diagnosis

Female. Body length 2.13 mm. Head ocellar area having thirteen setae, each dorsal orbital margin with three short setae. Antennal radicle (Triapitsyn & Berezovisky, 2007; Fig. 1) with tubercles on the inner lateral surface; scape (ventral margin round) with longitudinal striations. Pronotum incompletely divided medially mesoscutum finely reticulate, anteriorly with one and one setae; scutellum as long as wide, with frenal fovea; propodeum with a short median carinae extending from anterior margin of metanotum, the V-shaped carinae of propodeum (Triapitsyn & Berezovisky, 2007; Fig. 2) not reaching margin and jointing a tubercle on petiole insertion. Fore wing (Triapitsyn & Berezovisky, 2007; Fig. 3) about 3.4–3.8 x as long as broad, venation about 0.2x of wing length, distal macrocheta reaching the hind margin of wing. Hind wing about 31x as long as wide. Petiole concave medially, ovipositor about 9/10 length of gaster, exserted ovipositor about 0.24 x as long as gaster; ratio of ovipositor length and hind tibia length about 1.5:1.

Colour. General body colour brown; eyes and ocelli reddish black. Antennal clava except petiole light brown, scutellum and gaster blackish brown; femora, mid tibia and coxae, femora and hind tibiae dark brown; tarsi, except for last segments, light brown.

Male. Unknown.

Hosts. Unknown.

Distribution. India: Karnataka. (Japan, Malaysia, Sri Lanka)

Comments: The above diagnosis is based upon redescription and illustrations given by Triapitsyn & Berezovisky, 2007. This species looks somewhat related to *A. philippinense* Soyka by having narrow apical dark brown infuscated patch on the fore wing extending to the apical margin, but these species differ in the shape of propodeal carinae. In *A. tachikawai* the propodeal carinae extend about half length of propodeum, whereas in *A. philippinense* the carinae reach the anterior margin of propodeum.

5. *Acmopolynema incognitum* (Narayanan, Subba Rao & Kaur)

(Figures 30–34)

Maidliella incognita Narayanan, Subba Rao & Kaur, 1960: 889, Female. India, Delhi (NPC, not examined).

Polynema (*Maidliella*) *incognita* (Narayanan, Subba Rao & Kaur): Narayanan & Subba Rao, 1961: 667.

Acmopolynema incognita (Narayanan, Subba Rao & Kaur): Subba Rao & Hayat, 1983: 131, catalogue; Subba Rao, 1989: 154, Female. Mudigere record; Hayat, 1992: 85, Female, Aligarh record.

Acmopolynema incognitum (Narayanan, Subba Rao & Kaur): Hayat & Anis, 1999b: 303, records, Triapitsyn & Berezovskiy, 2007: 12–13, Female, diagnosis, figures. Anis & Rehmat, 2013: 2, checklist. Manickavasagam & Rameshkumar, 2013: 562, checklist.

Diagnosis.

Female. Body length, 1.17 mm. Antennal scape (Fig. 30) with cross ridges on inner surface, 2.1x as long as broad; pedicel shorter than F1, F2 longest, F4-F6 sub equal in length; clava 2.6x as long as broad, with 9 longitudinal sensilla. Fore wing (Fig. 31) 3.7x as long as broad with broad infuscated patch in middle of the disc with type C and F modified setae and presence of only one dorsal macrocheta on marginal vein. Propodeal carinae limit to half of the propodeum as in fig. 33. Ovipositor (Fig. 34) markedly exserted, ratio of ovipositor length and hind tibia length is 1.3: 1.

Colour. Body light brown except head dark brown, F6, clava brown. Mesosoma, procoxa, protrochanter, basal half of fore femur dark brown, wing venation, distal half of mid femur, and apical segment of all tarsi brown, remainder of leg segments yellow to light brown. Gaster dark brown except petiole yellow to light brown.

Relative measurements (slide): FVW, 55; POL, 40; DBT, 38; EH, 50; SCL, 35; SCW, 16; PL, 20; PW, 16; CLL, 74; CLW, 28; F1L, 25; F1W, 6; F2L, 43; F2W, 6; F3L, 35; F3W, 7; F4L, 20; F4W, 9; F5L, 20; F5W, 10; F6L, 20; F6W, 12; MESL, 180; MSCL, 66; SCTL, 46; PDL, 26; FFm, 100; FTb, 90; FTrs, 110; MFm, 90; MTb, 125; HFm, 120; HTb, 155; HTrs, 160; FWL, 390; FWW, 105; FFL, 45; HWL, 325; HWW, 10; HFL, 46; METL, 225; PETL, 50; OVL, 210; Ext. OVL, 25.

Male. Unknown. The male was recorded and described by Subba Rao (1989), but according to Triapitsyn & Berezovskiy (2007) this male belongs to some undescribed species of *Palaeoneura.*

Determined material examined: INDIA: UTTAR PRADESH: Aligarh, 3Females (on slides), February-March. 1979, Coll. M. Hayat & M. Verma; 1Female (on slide), 25.ii.1979, Coll. M. Verma; 1Female (on slide), 5.i.1979, Coll. M. Hayat; Aligarh, 1Female (on card), 17.iii.1981, Coll. M. Hayat. 1Female (on card), 23.iii.1979, Coll. M. Verma. 1Female (on card), iii. 1980, Coll. M. Hayat & M. Verma; 1Female (on card), 12.i.1980, Coll. M. Hayat & M. Verma; 2Females (on card), 12.iii.1985, Coll. M. Hayat & M. Verma; 1Female (on card), 1.iii. 1979, Coll. M. Hayat & M. Verma (all determined by M. Hayat, 1989 as *Acmopolynema incognita*).

Host. Unknown.

Distribution. India: New Delhi, Uttar Pradesh.

Comments. *Acmopolynema incognitum* can be recognized by the presence of a broad infuscated patch on fore wing disc with darker setae in middle of the patch, discal setation dense in distal half; scape with cross ridges on inner side and propodeal carinae short not reaching to anterior margin of propodeum.

6. *Acmopolynema problema* Triapitsyn & Berezovskiy

(Figures 35–39)

Acmopolynema problema Triapitsyn & Berezovskiy, 2007: 13–15, Female. India, Karnataka (BMNH, not examined).

Acmopolynema incognita (Narayanan, Subba Rao & Kaur): Subba Rao, 1989: 154, Female. India, Delhi, Karnataka (misidentification according to Triapitsyn & Berezovskiy, 2007: 13, Female, description, diagnosis, figures).

Acmopolynema problema Triapitsyn & Berezovskiy: Anis & Rehmat, 2013: 2, checklist. Manickavasagam & Rameshkumar, 2013: 562, checklist.

Diagnosis

Female. Body length, 1.03 mm. Antennal scape (Fig. 36) smooth, 3x as long as wide, pedicel about 0.8x as long as F1; F2 and F3 subequal in length, F4–F6 almost subequal in length; clava 2.8x as long as broad. Fore wing (Fig. 37) 4.2x as long as wide and longest marginal cilia about 3/4 of fore wing width; base of disc bare except a line of setae running from behind of marginal vein to the brown band, remainder of blade unevenly setose (only F and G type of setae on infuscated band). Propodeum with long V-shaped carinae as in fig. 38. Ovipositor (Fig. 39) as long as gaster, a little exserted at apex, about 1/10 of the total length of ovipositor, ratio between ovipositor length and hind tibia length is 1.1: 1.

Colour. Body light brown except F2 and F3 brown, basal part of F4 light brown, F5and F6 white. fore wing having one infuscated band.

Relative measurements (slide): FVW, 63; POL, 50; DBT, 45; TL,13; EH, 48; SCL, 33; SCW, 11; PL, 25; PW,15; CLL, 90; CLW, 32; F1L, 30; F1W,6; F2L, 55; F2W, 6; F3L, 55; F3W, 7; F4L, 33; F4W, 10; F5L, 30; F5W, 12; F6L, 28; F6W, 17; MESL, 180; MSCL, 60; SCTL, 45; PDL, 30; FWL, 450; FWW, 105; FFL, 72; HWL, 300; HWW, 8; HFL, 60; FFm, 100; FTb, 100, FTrs, 140; FBstr, 60; MFm, 120; MTb, 160; HFm, 140; HTb, 160; HTrs, 140; MSTL, 170; PETL, 55; OVL, 170; Ext. OVL, 30.

Male. Unknown.

Material examined: INDIA: KARNATAKA: Bangalore, Nandi Hills, 2Females (on slides), 11. iii. 2010, Coll. F.R. Khan.

Host. Unknown.

Distribution. India: Delhi, Karnataka.

Comments. This species is closely related to *A. incognitum* by fore wing disc with one infuscated patch in the middle but differ by scape smooth, F2 and F3 brown, basal part of F4 light brown, F5 and F6 white and fore wing with different pattern of discal setation as in fig. 37. In *Acmopolynema incognitum:* Scape with cross-ridges on inner surface, F1-F5 whitish and F6 dark brown and fore wing as in fig. 31.

7. *Acmopolynema malabaricum* Subba Rao

Acmopolynema malabarica Subba Rao, 1989:153, Female. India, Kerela, Periyar Animal Sanctuary (BMNH, not examined).

Acmopolynema malabaricum Subba Rao: Hayat & Anis, 1999b: 303, key, records; Triapitsyn & Berezovskiy, 2007: 32–33, diagnosis, figures, records. Anis & Rehmat, 2013: 2, checklist. Manickavasagam & Rameshkumar, 2013: 562, checklist.

Diagnosis

Female. Antennal scape nearly as broad as pedicel. F3 longest, slightly longer than F2. Clava about 2x of F4 and with 9 longitudinal sensilla. Propodeum smooth with short V-shaped carinae. Ovipositor exserted markedly long beyond gastral apex.

Colour. Head and thorax except clava and pronotum dark brown. Fore and mid legs entirely; hind coxae and tarsi; petiole, antenna except clava, yellowish brown. Fore wings characterized by presence of only one infuscated patch (apically) and a narrow infuscation in middle of the fore wing. Gaster except distal two tergites, ovipositor sheath, hind femur and tibiae partially, all tarsai with last tarsal segments dark brown.

Male. Unknown.

Host. Unknown.

Distribution: India: Kerala.

Comments. The above diagnosis is based upon the original description and illustrations given by Subba Rao, 1989. This species seems close to *A. orientale* on the basis of presence of two infuscated patch on fore wing disc. It differs from *A. orientale* by the characters given in the key.

8. *Acmopolynema campylurum* Xu & Lin

(Figures 40–44)

Acmopolynema campylurum Xu & Lin 2002: 147–148, Female. China, Jinshan (FACC, not examined).

Acmopolynema campylurum Xu & Lin: Triapitsyn & Berezovskiy 2007: 25–26, key, diagnosis, figures, records.

Redescription

Female. Body length, 1.7 mm.

Head (Fig. 40). Vertex with short and blunt setae. Mandibles tridentate with upper tooth rounded. Antennal scape (Fig. 41) with cross ridges, about 2x as long as wide; pedicel shorter than F1; F2 longest, F3 longer than other following segments; F5–F6 subequal in length, F6 widest of all segments and without longitudinal sensillum; clava (Fig. 41) 3.4x as long as wide, with 8 longitudinal sensilla.

Mesosoma (Fig. 43) smooth. Pronotum entire with short and blunt setae. Mesoscutum longer than scutellum. Axilla with one blunt seta and 2–3 foveae. Scutellum without row of frenal foveae; scutellar placoid sensilla close to anterior margin of scutellum. Propodeum with submedial carinae very short and medial groove extending from anterior margin to posterior margin of propodeum. Fore wing (Fig. 42) 4.3x as long as wide; marginal vein with 2 dorsal macrocheta; longest marginal fringe 0.45x greatest width of wing; disc unevenly setose with 2 brown spots, basal spot with modified setae of type F and G type and normal setae on apical spot. Hind wing hyaline; longest marginal fringe about 4.1x greatest width of wing.

Metasoma (Fig. 44). Petiole ridged posteriorly and about as long as metacoxa. Coxae smooth except hind coxae and hind tibia reticulated covered with short and blunt setae. Fore tibia with 2 rows of 10–12 peg-like sensilla. Ovipositor longer than gaster (370: 345); slightly exserted about 0.17x of its length; ovipositor length: hind tibia length about 1.5: 1.

Colour. Body brown, petiole pale; scape, pedicel, F1–F2 and F5–F6 yellow; F3–F4 brown and clava dark brown. Fore wing with two infuscated patches as in Fig. 42; middle terga of gaster dark brown;exserted part of ovipositor dark brown; medial part of mid femur, most of meta coxae, femur, distal three-quarters of hind tibia dark brown and last tarsal segments of all legs brownish; tarsal segments 1–3 pale.

Relative measurements (slide): FVW,75; POL, 46; DBT, 43; TL, 10; SCL, 40; SCW, 20; PL, 30; PW,16; CLL, 120; CLW, 35; F1L, 50; F1W,8; F2L, 80; F2W, 8; F3L, 75; F3W,10; F4L, 65; F4W, 11; F5L,36; F5W,11 ; F6L, 35; F6W,16; MESL, 235; MSCL, 82; SCTL, 60; PDL, 40; FWL, 670; FWW, 155; FFL, 70; HWL, 500; HWW, 12; HFL, 50; FFm, 120; FTb, 140, FTrs, 200; FBstr, 100; MFm, 120; MTb, 190; MTrs, 230; MBstr, 120; HFm, 140; HTb, 235; HTrs, 250; HBstr, 150; METL, 345; PETL, 100; OVL, 370; Ext. OVL, 65.

Male. Unknown.

Material examined. INDIA: UTTARAKHAND: Kashipur, Pipalia, 1Female (on slide), 24.x.2009, Coll. F.R. Khan.

Hosts. Unknown.

Distribution. India **(present record)**: Uttarakhand. (China)

Comments: It is new record from India. *A. campylurum* close to *A. malabaricum* by fore wing disc with one apical infuscated patch and slight infuscation in the middle, short V-shaped carinae on propodeum, but differ by a medial groove extending from anterior to posterior margin of the propodeum and ovipositor slightly exserted about 0.17x of its own length.

9. *Acmopolynema orientale* (Narayanan, Subba Rao & Kaur)

(Figures 45–51)

Maidliella orientalis Narayanan, Subba Rao & Kaur, 1960: 888–889, Female. India, Delhi, (NPC,? lost; data on the presumed holotype given by Hayat & Anis, 1999c, not examined).

Polynema (Maidliella) orientalis (Narayanan, Subba Rao & Kaur): Narayanan & Subba Rao, 1961: 667.

Polynema orientalis (Narayanan, Subba Rao & Kaur): Subba Rao & Hayat, 1983: 139.

Acmopolynema maculatum Subba Rao, 1989: 155, Female. India, Himachal Pradesh, Mandi–Nerchowk (BMNH). Synonymized by Triapitsyn & Berezovskiy, 2007: 27.

Acmopolynema maculatum Subba Rao: Hayat & Anis, 1999b: 306–307. Female. Redescription, illustrations.

Acmopolynema nixoni Subba Rao, 1989: 156, Female. India, Karnataka, Mudigere (BMNH). Synonymized by Triapitsyn & Berezovskiy, 2007:27.

Acmopolynema nixoni Subba Rao: Hayat & Anis, 1999b: 303–304, Female. Redescription, illustrations.

Acmopolynema dravida Subba Rao, 1989: 157, Female. India, Tamil Nadu, Coimbatore (BMNH). Synonymized by Hayat & Anis, 1999b: 306.

Acmopolynema orientalis (Narayanan, Subba Rao & Kaur): Hayat, 1992: 85, Female, Aligarh.

Neonarayanella orientalis (Narayanan, Subba Rao & Kaur): Husain & Farooqi, 1996: 83, transfer of the species.

Acmopolynema orientale (Narayanan, Subba Rao & Kaur): Hayat & Anis, 1999b: 304–306, diagnosis. Xu & Lin, 2002: 145–147. Triapitsyn & Berezovskiy, 2007: 27, Female, diagnosis, Male, redescription, figures. Anis & Rehmat, 2013: 2, checklist. Manickavasagam & Rameshkumar, 2013: 562, checklist.

Diagnosis

Female. Body length, 1.3–2.2 mm. Antennal scape + redicle length, at least as long as F1 length or slightly longer than F1; F1–F6 as in fig. 46 and clava 2.8x as long as broad; propodeal carinae reaching to its anterior margin; fore wing (Fig. 47) about 3.1–3.6x as long as broad, with 3–4 curved discal setal tracts; pronotum length, about more or less half the length of mid lobe of the mesoscutum; ratio of ovipositor length and hind tibia length is 1.2–1.8: 1.

Colour. Body colour pale testaceous yellow to dark brown; funicle segments light brown with dark brown clava. Fore wing disc with two infuscated patches, apical with narrow subrectangular to large oval infuscated patch

Relative measurements (slide): FVW, 70; EH, 75; DBT, 50; SCL, 43; SCW, 20; PL, 30; PW, 20; CLL, 100; CLW, 35; F1L, 42; F1W, 6; F2L, 70; F2W, 6; F3L, 60; F3W, 6; F4L, 30; F4W, 10; F5L, 32; F5W, 13; F6L, 28; F6W, 15; MESL, 250; MSCL, 95; SCTL, 58; PDL, 45; FWL, 660; FWW, 180; FFL, 35; FFm, 130; FTb, 130, FTrs, 190; FBstr, 85; MFm, 130; MTb, 175; MTrs, 230; MBstr, 115; HFm, 140; HTb, 220; HTrs, 245; HBstr, 130; METL, 385; PETL, 100; OVL, 410; Ext. OVL, 65.

Male. Similar to female except for normal sexually dimorphic characters such as antenna and genitalia; fore wing hyaline, with a very small infuscated spot on the disc (Male described by Narayanan *et al.*, 1960) or without an infuscated spot on the disc (Male described from Sri Lanka by Triapitsyn & Berezovskiy, 2007).

Determined material examined. INDIA: UTTAR PRADESH: Aligarh, 1Female (on slide), 13.iii.1981, Coll. M. Hayat. 1Female (on slide), 27.viii.1988, Coll. M. Hayat (determined by M. Hayat, 1989 as *Polynema orientalis*).

Host. Unknown.

Distribution. India: Delhi, Himachal Pradesh, Karnataka, Kerala, Puducherry, Tamil Nadu, Uttar Pradesh, West Bengal (China, Sri Lanka, Thailand).

Comments. *Acmopolynema orientale* is closely related to *Acmopolynema malabaricum* by fore wing disc with at least 2 or 3 distinct, curved setal tracts, one

large infuscated patch in apical third and usually also infuscate in middle, body, except pronotum, petiole and last two gastral tergites, dark brown, but differ by the body more or less completely golden to pale orange to brownish yellow, propodeum length about 0.5–0.6x length of mid lobe of mesoscutum.

2. Genus *Alaptus* Westwood

(Figures 52–75)

Alaptus Westwood, 1839: 79. Type species *Alaptus minimus* Westwood, by monotypy.

Parvulinus Mercet, 1912: 332. Type species *Parvulinus auranti* Mercet, by monotypy. Synonymized by Girault, 1913: 221.

Metalaptus Melenotti, 1917: 339. Type species *Metalaptus torquatus* Malenotti, by monotypy. Synonymized by Girault, 1917: 1.

References: Anwar & Zeya, 2014, review of Indian species.

Diagnosis

Female. Body length, 0.21–0.32 mm. Antenna 8-segmented (Fig. 56), formula 1151, all segments usually longer than broad; clava entire, usually with 2–3 longitudinal sensilla. Mesosoma (Fig. 59) with mesophragma extended deeply into gaster. Fore wing (Fig. 57) long and narrow with posterior margin behind venation usually deeply and abruptly excised and its hind margin usually straight so that the fore wing beyond basal excision widens evenly and continuously towards wing apex; marginal vein very short, stigmal vein almost absent. Hind wing long and marginal fringe not less than 6x as long as wing width. Tarsal formula 5–5–5. Gaster (Fig. 59) sessile or subsessile. Ovipositor slightly to strongly exserted.

Colour. Body light brown to brown, except head sometimes dark brown; antennal segments yellow, clava yellowish brown to brown.

Male. Similar to female, except for the genitalia and antenna. Antennal flagellum 8-segmented (Fig. 60). Genitalia with phallobase rather short, with long laminar volsellar digiti; aedeagus encapsulated (Viggiani, 1989).

Hosts. Unknown for Indian species. Elsewhere reported from eggs of Psocoptera and Coccoidea.

Species. World, 54 species (Noyes, 2015); India, 8 species (including one new species).

Distribution. Cosmopolitan.

Comments: The genus is distinguished from other genera of the group mainly by fore wing with posterior margin behind venation usually deeply and abruptly excised, hind wing margin straight, beyond venation widens evenly towards apex. *Alaptus* mostly confused with genus *Dicopomorpha,* by funicle 7-segmented and fore wing posterior margin slightly curved at apex. The genus *Alaptus* was previously known from India by three species, *A. magnanimus* Anandale (1909), *A. delhiensis* Mani (1942) and *A. ramkrishnai* Mani (1942). It was recently a reviewed by Anwar & Zeya (2014) who added three new species and provided a key to the Indian species. Rehmat & Anis (2014) also described a species from India. In the present work diagnosis of all the 7 species, including a new species, along with a key to Indian species of *Alaptus* is given.

Key to Indian species of *Alaptus* (females and males)

1. Female; flagellum 6-segmented; clava large and differentiated from funicle (Fig. 56) 2

-. Male; flagellum 8-segmented, clava not differentiated from funicle segments (Fig. 60) 8

2. Antenna with all funicular segments almost quadrate, clava slightly longer than funicle ..... 1. *delhiensis* Mani

-. Not all funicular segments quadrate, clava shorter than or at most as long as funicle 3

3. F1 quadrate, and shorter than F3 (Fig. 53) 4

-. F1 and F2 each distinctly longer than broad, not shorter than F3 (Fig. 56) 5

4. Antennal scape shorter than combined lengths of F1–F4, clava shorter than F2–F5 combined (Fig. 53) ..... 2. *macrurus* sp. nov.

-. Antennal scape almost equal to combined lengths of F1–F4, clava subequal to F2–F5 combined ..... 3. *ramakrishnai* Mani

5. Head dark brown or with area around mouth margin pale brown (Fig. 55); mesophragma extends almost to half length of gaster (Fig. 59); fore wing with a line of five setae in middle of disc (Fig. 57); ovipositor exserted to about one-third length of gaster 6

-. Head pale yellow; mesophragma occupies one-third length of gaster (Anwar & Zeya, 2014; Fig. 9); fore wing disc bare, or at most with two setae in the middle of disc (Anwar & Zeya, 2014; Fig. 7); ovipositor slightly exserted beyond the apex of gaster (Anwar & Zeya, 2014; Fig. 9) ..... 4. *pyronus* Anwar & Zeya

6. Fore wing disc with a row of setae along anterior margin (Fig. 57); clava not pointed at apex (Fig. 56) .....5. *deccanensis* Anwar & Zeya

-. Fore wing with 5 setae in middle of the disc (Fig. 65); clava pointed at apex (Fig. 64) 7

7. Head dark brown with area around mouth margin pale brown; antennal pedicel robust (Fig. 64); clava slightly shorter than funicle; ovipositor originates near base of gaster and strongly exserted at apex (Fig. 68) .... 6. *ramamurthyi* Anwar & Zeya

-. Head completely dark brown; antennal pedicel normal, not robust (Fig. 70); clava about F2–F5 combined as long as F2–F5 combined, and markedly shorter than funicle; ovipositor originate from T2 of gaster and slightly exserted at apex (Fig. 73) ..... 7. *jowainus* Rehmat & Anis

8. F4 quadrate; fore wing disc with 2 setae and a row of setae each along anterior and posterior margin ..... 8. *magnanimus* Anandale

-. F4 longer than broad; fore wing disc with a row of setae in middle or along anterior margin 9

9. Fore wing 12.6x as long as broad with 8 discal setae in the middle (Fig. 74); pedicel 2x as long as broad, much longer than F1 (Fig. 75) .... 7. *jowainus* Rehmat & Anis

-. Fore wing 10x as long as broad with a row of discal setae along anterior win margin (Fig. 61); pedicel 1.75x as long as broad, almost equal to F1 (Fig. 60 ..... 5. *deccanensis* Anwar & Zey

1. *Alaptus delhiensis* Mani

Alaptus delhiensis Mani, 1942: 160, Female. India, New Delhi (NPC, nc examined).

Alaptus delhiensis Mani: Subba Rao & Hayat, 1983: 131; 1986: 180, catalogue Anis & Rehmat, 2013: 2, checklist. Manickavasagam & Rameshkumar 2013: 562, checklist. Anwar & Zeya, 2014: 32, 33, diagnosis, key.

Diagnosis

Female. Body length, 0.25 mm. Head 2x as broad as long. Antennal scape distinctl shorter than clava; pedicel about 0.5x of scape length and equals to F1–F combined; all funicle segments almost quadrate, F4 and F5 longer than F3; clav slightly longer than F1–F5 combined.

Colour. Body dark brown.

Male. Unknown.

Hosts. Unknown.

Distribution. India: Delhi.

Comments. The above diagnosis is based on the original description and th illustration given by Mani (1942) and redescription given by Subba Rao (1989 *Alaptus delhiensis* differ from *A. ramakrishnai* Mani in having the antenna wit funicle segments short, broader than long to at most quadratic, and clava longer tha funicle. In *Alaptus ramakrishnai,* F1 quadrate, F2–5 each slightly longer than broac clava as long as F2–5 combined.

2. *Alaptus macrurus* sp. nov.

(Figures 52–54)

Description

Female. Body length (Holotype), 0.21 mm.

Head (Fig. 53). Occipital region with transverse striations; superaorbital trabeculae divided into 7 small pieces; transverse trabeculae undivided; 6 pairs of setae on frontal region, 1+1 seta close to each toruli; occipital region with a pair of long setae. Mandibles unidentate. Antennal scape (Fig. 53) with longitudinal striations; pedicel smooth smaller than scape length; F1 quadrate (5:5); F2–F5 each slightly longer than broad, with whorls of long setae, F1 subequal to F2, F5 longest, clava as F1–F5 combined, and with 2 longitudinal sensilla.

Mesosoma (Fig. 54) Pronotum (not visible in dorsal view) in lateral view with 1 seta each posterolateral corner; mesoscutum with transverse reticulations, each lateral lobe with one seta, 1+1 seta on middle lobe, notali complete; each axilla with one long seta; scutellum about 0.8x of mesoscutum length, anterior scutellum with 2 placoid sensilla each towards axilla, lateral part of posterior scutellum with some reticulations, mesophragma largely projecting into gaster. Fore wing (Fig. 52) 12.2 x as long as broad with 2 discal setae arranged in middle and one seta below venation; longest marginal fringe 6.6 x of wing width. Hind wing equal to fore wing in length, with a row of setae or along anterior margin, longest marginal fringe 8.3x as long as wing width. Legs normal; mid tibia with 2 strong anterior setae; tibial spur short.

Metasoma (Fig. 52) longer than mesosoma, 1.3x of thorax length; each tergite with 1+1 seta; ovipositor originates from end of tergite four (T4) of gaster, and exserted at apex; exserted part of ovipositor about 0.3x (one third) the gaster length; 0.4x of its own length, total ovipositor length about 0.8x of gaster length.

Colour. Body dark brown except mandibles golden yellow. Fore wings hyaline except basal part below venation slightly infuscate. Hind wings infuscate. Legs light brown or yellowish brown.

Relative measurements (slide): DBT, 12; SCL, 28; SCW, 7; PL, 12; PW, 8; CLL, 35; CLW, 9; F1L, 5; F1W, 5; F2L, 5; F2W, 5; F3L, 7; F3W, 4; F4L, 8; F4W, 6;

F5L, 9; F5W, 7; MESL, 38; MSCL, 16; SCTL, 13; MesoPL, 32; PDL, 5; FWL, 110; FWW, 9; FFL, 60; HWL, 110; HWW, 6; HFL, 50; FFm, 32 ; FTb, 25, FTrs, 36; MFm, 37; MTb, 50; MTrs, 43; HFm, 37; HTb, 41; HTrs, 44; METL, 50; OVL, 41; Ex OVL, 18.

Male. Unknown.

Material examined. *Holotype* Female (on slide under a single coverslip): INDIA: DELHI: Indian Agriculture Research Institute (IARI); probably collected in 2011, Coll. Anonymous

Hosts. Unknown.

Distribution. India: Delhi.

Etymology. Greek *makrós* = long, and *oùrá* = tail, and refer to the long ovipositor.

Comments. *Alaptus macrurus* sp. nov. is among one of the smallest Indian species of the genus *Alaptus.* This species also close to *A. ramakrishnai* Mani by having F1 quadrate but differ by antennal scape shorter than combined length of F1–F4 and clava longer than F2–F5 combined. In *A. ramakrishnai:* Antennal scape almost equal to combined length of F1–F4, clava subequal to F2–F5 combined.

3. *Alaptus ramkrishnai* Mani

Alaptus ramakrishnai Mani, 1942: 159, Female. Holotype Male=Female, India, Coimbatore, (NPC, not examined).

Alaptus ramakrishnai Mani: Subba Rao & Hayat, 1983: 131; 1986: 180, catalogoue. Anis & Rehmat, 2013: 2, checklist. Manickavasagam & Rameshkumar, 2013: 562, checklist. Anwar & Zeya, 2014: 32, 35, key, diagnosis.

Diagnosis

Female. Body length, 0.25 mm. Head broader than long. Antennal scape equal to F1–F4 combined and distinctly shorter than clava; pedicel subequal to combined length of F1 and F2, F1 and F2 quadrate, shorter than F3; F3–F5 subequal, and each increasing in length distally; clava subequal to F2–F5 combined.

Male. Unknown.

Host. [Pseudococcidae] Mealybug on coconut (Mani, 1942).

Distribution. India: Tamil Nadu.

Comments. The diagnosis given above is based upon the original description and illustration given by Mani, (1942; Fig. 21). This species differs from the other Indian species by the characters given in the key.

4. *Alaptus pyronus* Anwar & Zeya

Alaptus pyronus Anwar & Zeya, 2014: 34, Female. India, Uttarakhand (ZDAMU, examined).

Diagnosis

Female. Body length, 0.27 mm. Mandibles unidentate. Antennal scape about 2.7x as long as broad, subequal to pedicel and F1 combined; pedicel about 1.87x as long as broad. All funicle segments longer than broad, F2 slightly longer than F1 and F3; clava about 4x as long as broad, subequal to F2–F5 combined, having 3 longitudinal sensilla (Anwar & Zeya, 2014; Fig. 6). Fore wing (Anwar & Zeya, 2014; Fig. 7) about 11x as long as broad, two dical setae in the middle of the disc, remaining disc bare; marginal fringe about 4.78x as long as wing width. Hind wing about 18.1x as long as broad, marginal fringe 7.5x as long as wing width. Ovipositor (Anwar & Zeya, 2014; Fig. 9) slightly exserted beyond apex of gaster and 1.25x as long as mid tibia.

Colour. Body pale yellow except area around mouth margin yellow, flagellum, distal half of gaster and ovipositor brown. Wings subhyaline. Legs, including coxae, pale yellow.

Male. Unknown.

Type material examined. *Holotype* Female (on slide): INDIA: UTTARAKHAND: Dehra dun, Sahaspur, 11.xi.2011, Coll. P.T. Anwar. (ZDAMU, Registration No. HYM.CH.670)

Hosts. Unknown.

Distribution. India: Uttarakhand.

Comments. The above diagnosis is based upon the original description and figures given by Anwar & Zeya, 2014. This species is close to *A. ramakrishnai* Mani, by having F2–F5 subequal to clava, but differ by pedicel shorter than F1and F2 combined; all funicle segment longer than broad and slightly decreasing in length distally (In *A. ramakrishnai*: F1and F2 quadrate, F3–F5 slightly longer than broad, and F1–F5 increasing in length distally).

5. *Alaptus deccanensis* Anwar & Zeya

(Figures 55–62)

Alaptus deccanensis Anwar & Zeya, 2014. 32–33, Female. India, Karnataka (ZDAMU, examined).

Diagnosis

Female. Body length, 0.32 mm. Mandibles bidentate with dorsal tooth distinctly shorter than ventral tooth (Fig. 55). Antennal scape about 2x as long as pedicel and shorter than clava; pedicel equal to F4, F2 longest, F3 and F4 almost equal in length, F5 shortest; funicle all longer than broad, clava 3x as long as broad, slightly shorter than F3–F5 combined, with 3 longitudinal sensilla. Fore wing (Fig. 57) 10–10.6x as long as broad, discal setae arrange in a row running slightly below the anterior wing margin, remaining disc bare; marginal fringe 4x as long as wing width. Hind wing (Fig. 58) 20x as long as broad, marginal fringe 6.6x as long as wing width. Ovipositor (Fig. 59) originate from base of gaster; exserted 4.2–5.8x of its own length; about one-third length of gaster and 2.14x as long as mid tibia.

Colour. Body pale yellow except head dark brown, antennal segments F3–F5 and clava yellowish brown. Wings subhyaline. Legs, including coxae, pale yellow. Metasoma and ovipositor sheaths dark brown.

Relative measurements (slide): FVW, 38; EH, 30; TMMD, 40; DBT, 15; SCL, 24; SCW, 8; PL, 13; PW, 8; CLL, 40; CLW, 12; F1L, 11; F1W, 3; F2L, 15; F2W, 4; F3L, 13; F3W, 4; F4L, 12; F4W, 6; F5L, 12; F5W,7; MESL, 56; MESW, 50; MSCL, 23; MSCW, 40; SCTL, 17; SCTW, 38; MesoPL, 35; FWL, 155; FWW, 15;

FFL, 62; HWL, 55; HW.W, 8; HFL, 58; FTb, 45, MFm, 65; MTb, 50; MTrs, 50; HFm, 45; HTb, 50; HTrs, 50; HTb, 50; METL, 76; OVL, 72; Ext. OVL, 16.

Male. Length, 0.32 mm. Mandibles bidentate. Antenna (Fig. 60) 10-segmented; scape 2.3x as long as broad; pedicel 1.8x as long as broad, almost equal to F1; funicle segments longer than broad, F1 almost equal to F3; F4–F7 subequal. Fore wing (Fig. 61) 10x as long as broad with a row of discal setae adjacent to inner margin of the anterior wing margin. Hind wing 16.3–17.0x as long as broad. Two peg-like sensilla on fore tibia. Body yellowish, head dark brown. Fore wing hyaline; hind wing subhyaline.

Type material examined. *Holotype* Female (on slide). INDIA: KARNATAKA: Mandya (MT), 3.v.2012, Coll. K. Veenakumari. (ZDAMU, Registration No. HYM.CH.669)

Additional material examined. INDIA: KARNATAKA: Mandya, Narayan Gawda, 1Female (on slide), 2.i.2012, Coll. F.R.Khan; ORISSA [=ODISHA]: Puri, Matia Pada, 1Female, 1Male (on slides); 1.xii.2009, Coll. F.R.Khan; UTTARAKHAND: Dehra dun, F.R.I., 2Females (on slides), 4.xi.2009; Udaibagh, 3.xi.2009, Coll. F.R.Khan.

Hosts. Unknown.

Distribution. India: Karnataka, Orissa **(present record)**, Uttarakhand **(present record)**.

Comments. It is new record from the Indian state of Orissa and Uttarakhand. *Alaptus deccanensis*, differ from all other species by having larger body size (0.32mm) and antennal clava shorter than combined length of F3–F5. This species closely related with *Alaptus extremes* Soyka by most of the characters but differ mainly by antennal scape 3x as long as broad; F3 and F4 subequal and slightly longer than F5; fore wing with a row of discal setae adjacent to inner margin of anterior side of disc.

6. *Alaptus ramamurthyi* Anwar & Zeya

(Figures 63–68)

Alaptus ramamurthyi Anwar & Zeya, 2014, 35–36, Female. India, Uttrakhand (ZDAMU, examined).

Diagnosis

Female. Body length, 0.25 mm. Mandibles unidentate (Fig. 63). Antennal scape about 2x as long as broad, subequal to pedicel and F1 combined; pedicel about 1.5x as long as broad. All funicle segments longer than broad, F2 longest; F1 equal to F3; F4 and F5 subequal; clava pointed at apex, about 4.5x as long as broad, slightly shorter than F2–F5 combined, having 3 longitudinal sensilla. Fore wing (Fig. 65) 10.3x as long as broad, with five discal setae in the middle of the disc, remaining disc bare; marginal fringe about 5x as long as wing width. Hind wing (Fig. 66) 18.7x as long as broad, marginal fringe 8x as long as wing width. Ovipositor (Fig. 68) originate from base of gaster, about 1.4x as long as gaster; 1.25x as long as mid tibia and strongly exserted beyond apex of gaster, the exserted part about one third of gaster length.

Colour. Body brown to dark brown. Head dark brown except area around moth margin pale brown. Antennal segments pale yellow with clava brown. Mesosoma with pronotum dark brown, mesoscutum with faint reticulations, anterior third of mesoscutum brown. Scutellum and propodeum yellow. Wings subhyaline. Legs, including coxae, pale yellow. Metasoma brown, basal three intersegmental area yellow; ovipositor brown.

Relative measurements (slide): FVW, 45; EH, 25; TMMD, 40; DBT, 16; SCL, 22; SCW, 11; PL, 15; PW, 10; CLL, 43; CLW, 14; F1L, 9; F1W, 4; F2L, 10; F2W, 4; F3L, 8; F3W, 5; F4L, 9; F4W, 5; F5L, 10; F5W,5; MESL, 55; MESW, 45; MSCL, 25; MSCW, 44; SCTL, 21; SCTW, 40; FWL, 155; FWW, 15; FFL, 65; HWL, 150; HWW, 10; HFL, 60; FTb, 43, MFm, 65; MTb, 45; MTrs, 48; HFm, 65; HTb, 50; METL, 70; OVL, 94; Ext. OVL, 25.

Male. Unknown.

Type material examined. *Holotype* Female (on slide): INDIA: UTTARAKHAND: Dehra dun, Harbatpur, 14.xi.2011, Coll. P.T. Anwar (ZDAMU, Registration No. HYM.CH.671).

Additional material examined. INDIA: KERALA: Calicut, I.I.S.R. Campus, 7.i.2012, 1Female (on slide), Coll. F.R. Khan.

Hosts. Unknown.

Distribution: India: Uttarakhand, Kerala **(present record).**

Comments. It is new record from the Indian state of Kerala. *Alaptus ramamurthyi* seems close to *Alaptus deccanensis*, but differ by some characters as follows: smaller body size (0.25mm); scape 2.25x as long as broad; pedicel robust, and in having the clava slightly shorter than funicle. (In *A. deccanensis*: body larger in size, 0.32mm; F2 longest; scape 2.5x as long as broad, pedicel not robust, clava shorter than combined length of F3-F5).

7. *Alaptus jowainus* Rehmat & Anis

(Figures 69–75)

Alaptus jowainus Rehmat & Anis, 2014a: 53, 54, Female. Holotype, India, Meghalaya (ZDAMU, examined).

Diagnosis.

Female. (Body length, 0.38 mm). Head with transverse striations on occipital area; mandibles unidentate. Scape longitudinally striated; pedicel shorter than scape (16:23); funicle 5-segmented; F2 longest; clava with 3 longitudinal sensilla (Fig. 70). Fore wing (Fig. 71) 12.2x as long as broad with 5–8 discal setae (in paratypes) beyond venation, marginal fringe about half of wing width. Ovipositor originates from the end of tergite second (TII) of gaster, 1.14x as long as mid tibia and exserted at apex; exserted part of ovipositor 0.20x of gaster length.

Colour. Body brown to dark brown. Mandibles dark brown. Antenna brown except pedicel and scape light brown. Fore wing hyaline slightly infuscate at base (below venation). Hind wing infuscated; vein brown. Legs brown; tarsal segments light brown.

Relative measurements (Slide): HW, 60; EH, 21; TMMD, 10; DBT, 14; SCL,23; SCW,8; PL, 16; PW, 8; CLL, 40; CLW, 9; F1L, 9; F1W, 4; F2L, 12; F2W, 4; F3L, 9; F3W, 5; F4L,10; F4W, 5; F5L,10; F5W, 5; MESL, 58; MESW, 42; MSCL, 21; MSCW, 46; SCTL, 30; SCTW, 38; PDL,8; FWL, 147; FWW, 12; FFL, 72; HWL, 148; HWW, 7; HFL, 60; FTb, 33; FBstr, 10.5; MFm, 45; MTb,48; MBstr,13; HFm, 65; HTb,45; METL, 68; METW, 65; OVL, 55; Ex OVL, 14.

Male. Length, 0.39 mm. Head with transverse striations, mandibles bidentate. Antenna (Fig. 75) 10-segmented; scape 2.7x as long as broad, pedicel 2x as long as broad; funicle segments longer than broad, F1 subequal to F3; F4–F7 exactly equal, F8 longest. Fore wing (Fig. 74) about 12.6x as long as broad with 8 discal setae in the middle. Hind wing 18.8x as long as broad.

Type material examined: *Holotype* Female (on slide): INDIA: MEGHALAYA: Jowai Thaldskin, 22.x.2008, Coll. F.R. Khan. (ZDAMU, Registration No. HYM.CH.676)

Paratypes, 5Females (on slides): INDIA: UTTARAKHAND: Ranikhet, Chaubatia, 27.x.2009, Coll. F.R. Khan; 1Male (on slide): Dehradun, Udaibagh, 3.xi.2009, Coll. F.R. Khan. (ZDAMU, Registration No. HYM.CH.676)

Additional material examined. INDIA: WEST BENGAL: Darjeeling, Gorabari, Udaibagh, 1Female (on slide), 15.vi.2008, Coll. F.R. Khan.

Hosts. Unknown.

Distribution: INDIA: Meghalaya, Uttarakhand, West Bengal **(present record).**

Comments. It is new record from the Indian state of West Bengal. *Alaptus jowainus* Rehmat & Anis is close to *A. ramamurthyi* Anwar & Zeya, by having pointed clava and 5 discal setae on fore wing, but differs as follows: head completely dark brown, antennal pedicel not robust; clava sub equal to F2–F5 combined & markedly shorter than funicle; fore wing 12.2x as long as broad; ovipositor originates from T2 of gaster and slightly exserted at apex, exserted part about 0.2x of gaster length; ovipositor 1.14x as long as mid tibia. [In *Alaptus ramamurthyi* Anwar & Zeya, head dark brown with area around mouth margin pale brown; antennal pedicel robust;

clava slightly shorter than funicle (F1–F5); fore wing 10.3x as long as broad; ovipositor originates near base of gaster and strongly exserted at apex, exserted part about one-third of gaster length; ovipositor 2.27× as long as mid tibia].

8. *Alaptus magnanimus* Anandale

Alaptus magnanimus Anandale, 1909: 299, Male. India, Calcutta [= Kolkata] (ZSI, not examined)

Alaptus magnanimus Anandale: Subba Rao & Hayat, 1983: 131; 1986: 180, catalogue. Anis & Rehmat, 2013: 2, checklist. Manickavasagam & Rameshkumar, 2013: 562, checklist. Anwar & Zeya, 2014: 32–34, key & diagnosis.

Diagnosis

Male. Body length, 0.21 mm. Head broad (in dorsal view) with eyes large and elongated. Antenna 9-segmented having fine hairs, scape subcylindrical; F3, F5 and F6 distincly longer than broad, F4 quadrate. Pronotum about 4x as broad as long, slightly longer than anterior scutellum. Fore wing disc with 2 setae and a row of setae each along anterior margin and posterior margin. Fore wing long and narrow, obliquely rounded apically; Metasoma stout and rounded at apex; first tergite near the posterior margin having a single bristle on either side; last tergite with unequal bristles on either side.

Female. Unknown.

Hosts. Unknown.

Distribution. India: West Bengal.

Comments. Species diagnosis given above was based on the original description and figures given by Anandale (1909: plate XXIII). *Alaptus magnanimus* is smallest among males of Indian species. It differs by *A. deccanensis* and *A. jowainus* by having F4 quadrate; fore wing with two discal setae in the middle and a row of setae along anterior and posterior margin of wing. In *A. deccanensis*, fore wing disc with a row of setae along anterior margin and in *A. jowainus*, fore wing with 8 discal setae in middle of the wing.

3. Genus *Arescon* Walker

(Figures 76–90)

Arescon Walker, 1846: 50. Type species: *Mymar dimidiatus* Curtis, by monotypy.

Leimacis Foerster, 1847: 208. Type species: *Leimacis rufula* Förster, by monotypy. Synonymized by Foerster, 1856: 120.

Xenomymar Crawford, 1913: 349. Type species *Xenomymar urichi* Crawford, by original designation. Synonymized by Annecke & Doutt, 1961: 12.

Neurotes Enock, 1914. Type species *Neurotes iridescens* Enock, by monotypy. Synonymized by De Santis, 1967:102.

References: Triapitsyn & Berezovskiy, 2003, review of species from Primorskii Krai (Russia). Triapitsyn & Berezovskiy, 2004, notes on Palearctic species.

Diagnosis

Female. Body length, 0.4–0.74 mm. Antenna 8-segmented, formula 1151 (Fig. 76), clava entire. Pronotum very narrow, with 2+2 setae, mesoscutum with notauli well developed, axilla with 1+1 setae; metanotum with a central subtriangular dorsellum. Propodeum mostly smooth; mesophragma just reaching the posterior border of the propodeum. Fore wing venation about two-third of wing length and marginal vein much longer than submarginal vein (Fig. 77). Tarsal formula, 5–5–5; protibial spur not comb like along inner margin. Gaster subsessile. Ovipositor varying from slightly to moderately exserted.

Colour. Body yellow to light brown, Antennal segments yellow to light brown except clava light brown to dark brown. Fore wing and Hind wing hyaline to infuscate. Anterior part of pronotum, mesoscutum, axilla, anterior and lateral parts of propodeum dark brown. Legs pale yellow to light brown. Posterior most tergites of gaster mostly dark brown.

Male. Flagellum 11-segmented illustrated by Subba Rao (1966). Genitalia typical of the genus; phallobase long provided with parameres, basal body of the aedeagus having articulated apodemes (Viggiani, 1989).

Hosts. Reported from Cicadellidae (Hemiptera).

Distribution. Cosmopolitan.

Species. World, 23 species (Noyes, 2015); India, 4 species (including two new species described in the present work).

Comments. This genus differs from other genera on the basis of fore wings with venation about two-third wing length and marginal vein much longer than submarginal vein. Subba Rao & Kaur (1959) described *Arescon enocki* as a first species of Genus *Arescon* from India. After some years Subba Rao (1989), described another species of *Arescon*. Both species differentiated on the basis of fore wing chetotaxy and measurements of antennal segments. After Subba Rao & Kaur (1959) and Subba Rao (1989) lack of publications on this genus from India. Present work considered as an attempt to explain the current status of the genus *Arescon* from India.

Key to Indian species of *Arescon* (females)

1. Fore tibia with 5–6 peg like sensillum (Fig. 80), fore wing disc with densely setose (Fig. 77) 2

-. Fore tibia with more or less 7–16 peg like sensillum (Fig. 86), fore wing disc with sparsely setose with conspicuous bare area (Fig. 83) 3

2. F2 equals to F5 and F3 equals to F4 in length (Fig. 76); clava three segmented; fore wing hyaline (Fig. 77) .....1. *enocki* Subba Rao & Kaur

-. F3–F5 subequal in length F2 longest, F5 slightly shorter than F4; clava solid (Subba Rao, 1989; Fig. 66); fore wing infuscate (Subba Rao, 1989; Fig. 68) .... 2. *mudigerensis* Subba Rao

3. F2–F4 equal in length, F5 slightly smaller than F2–F4 each (Fig. 82); fore wing disc with bare area towards apex (Fig. 83), 15–16 peg like sensillum on fore tibia (Fig. 86) ..... 3. *meghalayaensis* sp. nov.

-. F2 equals to F5, F3 equals to F4 (Fig. 87), fore wing disc sparsely setose (Fig. 88); 7–10 peg like sensilla on fore tibia (Fig. 90) .... 4. *narendrani* sp. nov.

1. *Arescon enocki* (Subba Rao & Kaur)

(Figures 76– 81)

Neurotes enocki Subba Rao & Kaur, 1959: 227–238, Holotype Female (original description), India, Delhi, (NPC, not examined).

Arescon enocki (Subba Rao & Kaur): Anis & Rehmat, 2013: 3, checklist. Manickavasagam & Rameshkumar, 2013: 563, checklist.

Diagnosis

Female.

Head. Body, length 0.4–0.60 mm. Mandibles 4-dentate, with three teeth acute and one obtuse. Antenna (Fig. 76) with scape 1.8–2x of pedicel length; pedicel 0.4–2.1x of F1 length (longitudinal sensillum absent); F1 slightly longer than broad, F2 equal to F5 and F3 equal to F4, each with longitudinal sensillum and about 3x as long as broad; clava 3-segmented, 3.6–4x as long as broad, with 5 sensilla and few modified setae. Middle lobe of mesoscutum with fine longitudinally striated, lateral. scutellum smooth smaller than mesoscutum length; propodeum with fainted sculpture having 12–16 longitudinal lines radiate towards the base of the propodeum from posterior metathorax. Fore wing (Fig. 77) 3.6–4.5x as long as broad, with venation reaching beyond the middle of the wing, longest marginal fringe longer than wing width. Hind wing slightly shorter than fore wing length. Fore tibia with 5–6 peg like sensilla. Metasoma (Fig. 81) slightly longer than mesosoma, T1 smallest and size increases gradually upto T6 (largest); T7 triangular and smaller than T6; ovipositor slightly exserted from the apex of the gaster.

Colour. Body brownish yellow except anterior part of pronotum medial lobe and lateral lobe of mesoscutum, anterior scutellum and mandibles brown. Fore wings hyaline. Legs pale yellow.

Relative measurements (slide): FVW, 50; DBT, 18; EH, 37; POL, 14; SCL, 27; SCW, 8; PL, 15; PW, 8; CLL, 36; CLW, 10; F1L, 7; F1W, 4; F2L, 15; F2W, 5; F3L, 18; F3W, 6; F4L, 18; F4W, 5; F5L, 15; F5W, 6; MESL, 103; MSCL, 46; SCTL, 30; PDL, 18; FWL, 180; FWW, 47; FFL, 55; FFm, 40; FTb, 45, FTrs, 65; MFm, 40; MTb, 62; MTrs, 65; HTb, 64; HTrs, 60; HBstr, 12; METL, 115; METW, 65; OVL, 105; Ext. OVL, 15.

Male. Similar to the female except antenna 13-segmented, scape long and narrow, as long as the pedicel and the first funicular joint combined. Sensory ridges present on all the funicular joints.

Material examined. INDIA: ANDHRA PRADESH, Hyderabad, 1Female (on slide), 14.ii.2012, Coll. K. Veenakumari; UTTAR PRADESH, Agra, Tundla, Jadon Garhi, 1 Female (on slide), 04. iv. 2011, Coll. F.R. Khan; Tundla, Sikrari, 1 Female (on slide), 01.ix.2007, Coll. F.R. Khan; Qayamganj, Baryala, 1 Female (on slide), 07.ix. 2007, Coll. F.R. Khan; Lakhimpur, Lakkhi Purwa, 1 Female (on slide), 26.ix.2006, Coll. S.M.A. Badruddin & F.R. Khan; Aligarh, 1 Female (on slide), Nov.1980, Coll. M. Hayat (determined by M. Hayat as *Arescon enocki*)(ZDAMU).

Hosts. *Amrasca biguttula biguttula* (Cicadellidae) [Subba Rao, 1966; Subba Rao *et al.*, 1968; Kapadia & Mittal, 1995]

Distribution. India: Andhra Pradesh **(Present record)**, Bihar, Delhi, Gujarat, Himachal Pradesh, Karnataka, Maharashtra, Uttar Pradesh **(present record).**

Comments. It is new record from Indian states of Andhra Pradesh and Uttar Pradesh. Materials examined by the author were compared with the original description and illustrations given by Subba Rao (1966) and found to be conspecific by *A. enocki.* The species is similar to *A. mudigerensis* but differs by having hyaline fore wing and measurements of antennal segments and by 3-segmented clava. (see key to species)

2. *Arescon mudigerensis* Subba Rao

Arescon mudigerensis Subba Rao, 1989: 166–167, Female, India, Karnataka, Mudigere (BMNH, examined).

Arescon mudigerensis Subba Rao: Anis & Rehmat, 2013: 23, checklist. Manickavasagam & Rameshkumar, 2013: 563, checklist.

Diagnosis

Female. Head triangular, median carina undivided, very narrow and short; frontal carina divided into 2–3 pieces; transverse striations on occipital area, ocelli large and in acute-angled triangle, mandible 4-dentate. Antenna (Subba Rao, 1989; Fig. 66) 8-segmented all longer than broad, scape including redicula about 2.5x as long as pedicel and sub equal to clava length. F1 shortest, F3–F5 subequal in length, F5 slightly shorter than F4, F2 longest, F2–F5 each with 2 longitudinal sensilla, clava solid with two longitudinal sensilla. Mesosoma (Subba Rao, 1989; Fig. 67) with pronotum very narrow, with 2+2 setae, mesoscutum with notauli well developed, axilla with 1+1 setae. Metanotum with a central diamond shaped sculpture. Propodeum smooth, with 1+1 setae; mesophragma just reaching the posterior border propodeum. Fore wing venation about 2/3 the length of the disc; marginal fringe slightly less than 2x of the wing width. Fore tibia with 5–6 peg like sensilla. Metasoma slightly longer than mesosoma.

Colour. Body light brown. Wings infuscated and legs light brown.

Male. Unknown.

Hosts. Unknown.

Distribution. INDIA: Karnataka.

Comments. Above diagnosis based on original description and figures given by Subba Rao (1989). It differs from other Indian species by characters given in the key.

3. *Arescon meghalayaensis* sp. nov.

(Figures 82–86)

Description

Female. Body length (Holotype), 0.66 mm.

Head (damaged). Mandibles 4-dentate, with three teeth acute and one obtuse. Antenna (Fig. 82) with scape selender and longitudinally ridged; pedicel finely longitudinally striated, about 0.6x longer than F1 without longitudinal sensillum (10:16); funicle segments F1–F6 longer than broad, F2–F4 exactly equal; F5 slightly smaller than F2, F3 and F4, each with 2 longitudinal sensilla; clava entire without any segmental division, 2.9x as long as wide, almost subequal to F1and F2 combined, with 8 longitudinal sensilla and 10–12 modified setae (sensilla) grouped irregulary towards the apex.

Mesosoma (Fig. 85). Shorter than metasoma; pronotum narrow; mesoscutum with fine longitudinal striations, mid lobe of mesoscutum with a pair of long setae and each lateral lobe of mesoscutum with a strong seta; scutellum smooth, 1.6x shorter than mesoscutum, anterior scutellum almost equal than posterior scutellum, one seta on each side lobe or axilla and scutellar placoid sensilla in the centre, posterior scutellum with longitudinal striations; metanotum with a triangular dorsellum; propodeum smooth and almost equal than scutellum length. Fore wing (Fig. 83) 4.3x as long as broad, with venation reaching about half of the total wing length (218:113); marginal vein with 8 additional large setae, marginal fringe slightly infuscate; disc mostly bare except two rows of strong setae along lower margin of fore wing and a group of about 10 setae arranged at apex of the wing disc; longest marginal fringe 1.2x as long as wide. Fore tibia with 15–16 peg like sensilla as in fig. 86.

Metasoma (Fig. 85) longer than mesosoma; ovipositor exserted beyond the apex of gaster about 1/6 of the total length of ovipositor. Ovipositor slightly exserted, total length of ovipositor exactly equal to the length of gaster.

Colour. Body light brown except mandibles golden yellow. Antennal segments light brown except clava dark brown. Fore wing and hind wing infuscate. Anterior part of

pronotum, mesoscutum, axilla, anterior and lateral parts of propodeum dark brown, anterior scutellum golden yellow. Legs yellow. Posterior most tergites of gaster dark brown.

Relative measurements (slide). DBT, 17; SCL, 38; PL, 16; PW, 10; CLL, 38; CLW, 13; F1L, 10; F1W, 5; F2L, 29; F2W, 6.5; F3L, 29; F3W, 6.5; F4L, 29; F4W, 6.5; F5L, 26; F5W, 7; MESL, 105; MSCL, 45; SCTL, 27; PDL, 25; PETL, 5; FWL, 218; FWW, 50; FFL, 62; HWL, 200; HWW, 7; HFL, 38; FFm, 55; FTb, 58; FTrs, 80; FBstr, 22; MFm, 55; MTb, 81; MTrs, 77; METL, 120; OVL, 120; Ext. OVL, 18.

Male. Unknown.

Material examined. *Holotype* Female (on slide under 4 coverslips) INDIA: MEGHALAYA, Ri Bhoi, Khalauv, 21.x.2008, Coll. F.R. Khan (Registration no. HYM.CH 710)

Hosts. Unknown.

Distribution: INDIA: Meghalaya.

Etymology. The species is named after the Indian state of Meghalaya, from where the holotype is collected.

Comments. This species somewhat resembles to *Arescon iridescens* (Enock, 1914) by having a bare area on the fore wing disc, pedicel finely longitudinally striate, slightly longer than F1; all funicle segments much longer than than wide, F1 without longitudinal sensilla but *Arescon meghalayaensis* differs from the arrangement of discal setation on fore wing having two rows of discal setae and a group of about 10 setae towards apex of the wing, presence of two longitudinal sensilla from F2–F5, clava entire, without any subdivision. Fore wing 4.3x as long as broad, with venation reaching about half of the total wing length (In *A. iridescens:* fore wing having an oval bare area in the middle of the disc, F2–F5 with two longitudinal sensilla except F2 with only one longitudinal sensillum, clava entire, incompletely subdivided dorsoventrally. Fore wing about 3.3–3.4x as long as broad, with venation reaching 2/3 length of total wing length).

4. *Arescon narendrani* sp. nov.

(Figures 87–90)

Description

Female. Body length (Holotype), 0.74 mm.

Head (Fig. 87). Mandibles 4-dentate, with three teeth acute and one obtuse. Antenna (Fig. 87) with scape selender and transversely ridged; pedicel longitudinally striated, about 0.4x of next segment, F1 without longitudinal sensillum (7:15); funicle segments F1–F6 longer than broad, F2 equals to F5; F3 almost equal to F4, F3–F5 each with 2 longitudinal sensilla except F2 with only one sensillum; clava entire, incompletely subdivided dorsoventrally with 5 sensilla and 4–5 modified setae, 3.7x as long as broad almost 5.2x longer than F1.

Mesosoma (Fig. 89) 0.8x of metasoma; pronotum narrow; middle lobe of mesoscutum with fine longitudinal striations, lateral lobes have hexagonal cells with a pair of long setae. One pair of seta on each side lobe of anterior scutellum and scutellar placoid sensilla in the centre, posterior scutellum with longitudinal striations; metanotum with dorsellum; propodeum with some reticulations and slightly longer than scutellum. Fore wing (Fig. 88) 5x as long as broad, with venation reaching 2.1x as long as wing length; marginal vein with 8 additional large setae, blade slightly infuscate; disc sparsly setose in 3–4 rows; longest marginal fringe 0.6x as long as wing width. Fore tibia with 7–10 peg like sensilla as in fig. 90.

Metasoma (Fig. 89). About 1.0 x of mesosoma length. Total length of metasoma exactly equal to the length of ovipositor. Petiole short; exserted ovipositor 0.2x of the total length of ovipositor. Genitalia typical of the genus.

Colour. Body light brown except anterior part of pronotum medial lobe and lateral lobe of mesoscutum, anterior scutellum and mandibles golden yellow. Fore wings infuscate. Legs light yellow.

Relative measurements (slide): DBT, 15; SCL, 35; PL, 15; CLL, 37; CLW, 10; F1L, 7; F1W, 4; F2L, 22; F2W, 4; F3L, 24; F3W, 4; F4L, 23; F4W, 5.5; F5L, 22; F5W, 6; MESL, 110; MSCL, 35; SCTL, 35; PDL, 25; FWL, 203; FWW, 40; FFL,

65; FFm, 42; FTb, 45, FTrs, 73; FBstr, 20; MFm, 47; MTb, 65; MTrs, 70; HFm, 45; HTb, 75; HTrs, 70; HBstr, 15; METL, 130; OVL, 130; Ext. OVL, 30.

Male. Unknown.

Material Examined. *Holotype* Female (on slide under 2 coverslips) INDIA: UTTARAKHAND, Laxmipur, 03.xi.2009, Coll. F.R, Khan. (Registration No. HYM.CH. 711)

Hosts. Unknown.

Distribution. INDIA: Uttarakhand.

Etymology. The species is named after the memory of Prof. T.C. Narendran for his contribution in the field of taxonomy.

Comments. The species is closely resembles *Arescon meghalayaensis* sp. nov. by infuscate fore wing and hind wing, mandibles 4-dentate, with three teeth acute and one obtuse, pedicel finely longitudinally striate, mid lobe of mesoscutum with longitudinal striations but differ by the characters present in the key (F2 equals to F5, F3 equals to F4, fore wing disc sparsely setose with 3–4 rows; 7–10 peg like sensilla on fore tibia), including fore wing 5x as long as broad, discal setae sparsly arrange in about 3–4 rows. (In *A. meghalayaensis* sp. nov.: F2–F4 equal in length, F5 slightly smaller than F2–F4 each; bare area towards apex of the fore wing, 15–16 peg like sensilla on fore tibia).

4. Genus *Camptoptera* Foerster

(Figures 91–168)

Camptoptera Foerster, 1856: 116, 119, 144. Type species *Camptoptera papaveris* Foerster, by monotypy.

Pteroclisis Foerster, 1856: 144. Unnecessary replacement name for *Camptoptera*.

Stichothrix Foerster, 1856: 117,118,121. Type species *Stichothrix cardui* Foerster, by monotypy. Synonymized by Annecke & Doutt, 1961.

Eomymar Perkins, 1912: 26. Type species *Eomymar muiri* Perkins, by monotypy. Synonymized by Huber & Lin, 1999.

Congolia Ghesquiere, 1942: 320. Type species *Congolia sycophila* Ghesquiere, by original designation. Synonymized by Debauche, 1949.

Sphegilla Debauche, 1948: 62 Type species *Sphegilla franciscae* Debauche, by original designation. Synonymized by Yoshimoto, 1990.

Zemicamptoptera Ogloblin & Annecke, 1961: 24. Type species *Camptoptera* (*Zemicamptoptera*) *semialbata* Ogloblin & Annecke, by original designation (as subgenus of *Camptoptera*).

Wertanekiella Soyka, 1961: 87. Type species *Wertanekiella brevicornis* Soyka, by original designation. Synonymized by Mathot, 1969.

Staneria Mathot, 1966: 214. Type species *Staneria diademata* Mathot, by original designation. Synonymized by Huber & Lin, 1999.

Subsequent important references: Noyes & Valentine, 1989: 29. Yoshimoto, 1990: 32. Huber & Lin, 1999: 21–65, taxonomic history, diagnosis, discussion, list of world species. Rehmat & Anis, 2014a: 54, diagnosis, key, new species, records.

Diagnosis

Female. Mandibles unidentate. Antennal formula (Fig. 96), formula, 1161 or 1171; with F2 almost always ring- like (Fig. 96). Axilla with one long seta; scutellum without transverse row of frenal fovea; mesophragma not extending into gaster; propodeum about half as long as scutellum. Fore wing (Fig. 108) narrow near base, with posterior margin almost always concave, giving a distinctly curved apex; disc with 1–4 rows of setae; venation not extending beyond basal third of wing, with parastigma short. Hind wing (Fig. 109) narrow, about 20–30x as long as broad. Tarsi 5-segmented. Petiole, sometimes with lateral projections; ovipositor not or slightly exserted.

Colour. Head dark brown, Antennal segments and legs usually yellowish, varying to light brown, often with darker areas. Mesosoma dark brown; fore wing usually hyaline, sometimes with slight infuscation around venation; coxae, femora of fore and mid legs brown. Metasoma sometimes yellow or whitish towards basally.

Male. Flagellum (Fig. 112) 10-segmented, usually with F2 and F4 ring-like.

Hosts. Eggs of Coleoptera, particularly Buprestidae, Chrysomelidae, Ciịdae, Curculionidae (Scolytinae) and Derodontidae (Kryger, 1950: Huber, 1986, 1997, 2011; Denov, 1987a; Huber & Lin, 1999; Triapitsyn & Moraal, 2008; Vikberg & Martikainen, 2011). Due to incorrect rearing methods, all other non-coleopteran host records of authors need confirmation (Triapitsyn, 2014).

Distribution: Cosmopolitan.

Species. World, 60 species (Noyes, 2015); India, 17 species (including five new species and three new records from India in present work).

Comments. The genus is distinguished from other *Camptoptera* group of genera (Huber & Lin, 1999; Lin et al. 2007) mainly by funicle 7-segmented, with second segment usually very short or ring-like; mandibles unidentate; fore wing narrow, with posterior margin usually distinctly curved towards wing apex; petiole with lateral projections at mid point (Fig. 158).

Key to Indian species of *Camptoptera* (females)

(Modification of key given by Rehmat & Anis, 2014a)

1. F2 ring-like (Fig. 96) 2

-. F2 not ring-like (Fig. 91), longer than wide ..... 1. *muiri* (Perkins)

2. Head with transversely elongate cellulate-reticulate sculpture (Fig. 98) 3

-. Head with transversely striate reticulate or lineolate-reticulate sculpture (Fig. 101) 4

3. Mesoscutum with transversely reticulate sculpture; scutellum with polygonal cells medially, with longitudinal cells laterally; fore wing (Fig. 97) with 3-4 rows of discal setae ..... 2. *matcheta* Subba Rao

-. Mesoscutum with scale like reticulations; scutellum with cellulate-reticulate sculpture; fore wing (Fig. 102) with one row of discal setae ..... 3. *assamensis* Rehmat & Anis

4. Mesoscutum with transversely lineolate striate sculpture (Fig. 110) 5

-. Mesoscutum with reticulate sculpture (Fig. 124) 6

5. Scutellum with elongated polygonal cells; scape long, well dilated (Subba Rao, 1989; Fig. 83); pedicel shorter than scape; all funicle segments, except the second, longer than broad ..... 4. *brevifuniculata* Subba Rao

-. Scutellum with striate reticulate sculpture (Fig. 110) ..... 5. *dravida* Subba Rao

6. Mesosoma more or less fully sculptured by transverse reticulations, petiole without lateral projections (Fig. 124) 7

-. Mesosoma sculptured by both transverse reticulations and striations, petiole with lateral projections (Fig. 132) 8

7. Fore wing with three rows of discal setae (Fig. 116), scape smooth (Fig. 115) ..... 6. *minorui* Taguchi

-. Fore wing with bare disc (Fig. 121), scape with longitudinal striations (Fig. 120) ..... 7. *alanuda* sp. nov.

8. Head with transverse reticulations forming V-shaped sculpture, scape and pedicel with longitudinal striations (Fig. 127) 9

-. Head without V-shaped sculpture having transverse reticulations, scape and pedicel smooth (Fig. 140) 10

9. Clava shorter than combined length of scape and pedicel (Fig. 127), scutellum including axillae reticulate anteriorly but longitudinally striate posteriorly (Fig. 131), ovipositor slightly exserted (Fig. 132) ..... 8. *okadomei* Taguchi

-. Clava subequal to combined length of scape and pedicel (Fig. 133), scutellum with transverse reticulations laterally and large hexagonal cells medially (Fig. 137), ovipositor not exserted (Fig. 138) ..... 9. *cardigastra* sp. nov.

10. F1 subequal to pedicel 11

-. F1 much shorter than pedicel 12

11. Mesosoma with notauli incomplete (Fig. 144), propodeum with 8 teeth like projections on posterior slope of the propodeum with U-shaped carinae (Fig. 145); petiole smooth with lateral projection (Fig. 145) ..... 10. *fusca* sp. nov

-. Mesosoma with notauli complete (Fig. 149), propodeum with 7–10 teeth like projections on posterior slope of propodeum with W-shaped carinae; petiole with Y-shaped carinae (Fig. 152) ..... 11. *sakaii* Taguchi

12. Fore wing venation not divided (Fig. 160) 13

-. Fore wing venation divided into two parts (Fig. 155) ..... 12. *franciscae* (Debauche)

13. Scutellum with elongate polygonal cells (Fig. 87; Subba Rao, 1989); scape narrower than pedicel; petiole smooth ..... 13. *kannada* Subba Rao

-. Scutellum with transversely reticulate sculpture; petiole with lateral projections (Fig. 168) 14

14. 1st funicle segment twice the length of pedicel 15

-. 1st funicle segment as long as the length of pedicel..... 14. *ambrae* Viggiani

15. Mesoscutum with transverse reticulation having hexagonal cells anteriorly and conical cells ending in a denticle posteriorly (Fig. 166) 16

-. Mesoscutum with transverse reticulations without any denticles (Viggiani, 1978; Fig. III 2) ..... 15. *longifuniculata* Viggiani

16. Scutellum with longitudinal reticulation occasionally meeting in the middle (Fig. 161); fore wing with 5 discal setae in middle row (covers ¼ of wing length) (Fig. 160) ..... 16. *aligarhensis* sp. nov.

-. Scutellum with transverse reticulation laterally, medially forming V-shaped sculpture of longitudinal reticulations at anterior half (Fig. 166); fore wing with 10–12 setae in middle row (covers 2/3 of wing length) (Fig. 164) .... 17. *denticularis* sp. nov.

1. *Camptoptera muiri* (Perkins)

(Figures 91–95)

Eomymar muiri Perkins, 1912, 10: 26, Lectotype Female.?. Hawaiian Islands. (designated by Huber & Lin, 1999) (BPBM, not examined).

Camptoptera muiri (Perkins, 1912), Huber & Lin, 1999, 130: 28 (New combination for *Eomymar muiri* Perkins). Anis & Rehmat, 2013, 3: checklist. Manickavasagam & Rameshkumar, 2013, 563. Rehmat &Anis, 2014, 55: key.

Diagnosis (Indian species)

Female. Body length, 0.29 mm. Head (Fig. 91) with transverse reticulations; one seta near each torulus; scape and pedicel with longitudinal striations, pedicel about 0.7x as long as F1, F1 (longest) slightly longer than F2, F3–F5 subequal in length, F6, F7 equal in length. All funicle segments (F1–F7) longer than broad (without any ring segments), clava almost equal to the combined length of last three funicle segments. Mesosoma (Fig. 94) almost equal to the length of the metasoma, mesoscutum and scutellum having peculiar sculpture as in fig. 95. Fore wing (Fig. 92) 18. 1x as long as wide, one row of seta irregularly arranged in series in middle

of the disc and one long seta below marginal vein. Longest marginal fringe length about 7.9x as long as wing width. Hind wing (Fig. 93) 28.3x as long as wide. Metasoma (Fig. 94) triangular in shape, petiole ridged and ovipositor not much exserted; ratio between ovipositor to hind tibia length is 1.

Colour. Body dark brown except petiole, gaster, antenna and legs pale yellow.

Relative measurements (slide): HL, 40; HW, 57; EH, 28; FVW, 38; TMMD, 16; POL, 25; SCL, 27; SCW, 5; PL, 14; PW, 6; FnL, 106; CLL, 45; CLW, 8; F1L, 19; F2L, 17; F3L, 16; F4L, 15; F5L, 14; F6L, 13; F7L, 12; MESL, 80; MSCL, 24; SCTL, 32; PDL 22; FWL 200; FWW, 11; FFL, 87; HWL, 170; HWW, 6; HFL, 60; FFm, 40; FTb, 45; FTrs, 60; FBstr, 10; MTb, 70; HTb, 32; HTrs, 70; HBstr, 15; METL, 84; METW, 70; PETL, 11; OVL, 32.

Male. Unknown.

Material examined. INDIA: ORISSA, Bhubaneswar, Bariyanta, 1Female (*on* slide), 25.xi.2007, Coll. F. R. Khan; UTTARAKHAND: Udhamsingh Nagar, Bazpur, 1 Female (on slide), 24.x. 2009, Coll. F. R. Khan; Roorkee, Chiddarwala, 1Female (on slide), 2.xi.2009, Coll. F. R. Khan; KERALA: Alappuzha, Kayamkulam, 1 Female (on slide), 17. i .2012, Coll. F.R. Khan.

Host. Reared from eggs of Delphacidae (Perkins 1912), but that record is strongly doubtful.

Distribution. India: Kerala **(present record),** Orissa [=Odisha] **(present record),** Tamil Nadu, Uttarakhand **(present record).** [Hawaiian Islands and Indonesia (Huber & Lin, 1999; Noyes, 2014)].

Comments. It is new record from the Indian states of Kerala, Orissa [=Odisha] and Uttarakhand. The specimens recorded here were compared with the original description, figures given by Perkins (1912). This species differ from other species of the genus by absence of ring segment (F2) in funicle segments.

2. *Camptoptera matcheta* Subba Rao

(Figures 96–99)

Camptoptera matcheta Subba Rao, 1989: 160-162, Female, Male. India, Karnataka, Mudigere (BMNH, not examined).

Camptoptera matcheta Subba Rao, 1989: Anis & Rehmat, 2013, 3: checklist. Manickavasagam & Rameshkumar, 2013, 563.

Diagnosis

Female.

Head (Fig. 96) with transverse reticulations on occipital area. Antenna (Fig. 96) shorter than body; pedicel longer, F1 1.46x of F1 length. Mesosoma (Fig. 98) with mesoscutum short, less than half of the scutellum length, with transverse reticulations; anterior scutellum with polygonal cells; lateral scutellum with longitudinal cells as in figure 98; propodeum with two vertical carinae. Fore wing (Fig. 97) with 2–3 rows of discal setae, about 12.6x as long as broad. Hind wing 20.4x as long as broad. Metasoma (Fig. 99) 0.90x of mesosoma length; (T1) long, petiole ridged; ovipositor hardly exserted.

Colour. Body dark brown to black. Antenna dark brown. Fore wing infuscate at base; hyaline in apical half. Hind wing hyaline. Legs light brown; coxae dark brown.

Relative measurements (slide): HW, 77; HL, 52; EH, 30; FVW, 46; TL, 7; TMMD, 20; SCL, 38; SCW, 10; PL, 19; PW, 10; FnL 78; CLL, 42; F1L, 13; F2L, 1; F3L, 14; F4L, 11; F5L, 12; F6L, 11; F7L, 11; MESL, 90; MESW, 70; MSCL, 18; SCTL, 57; SCTW, 30; PDL, 31; FWL, 228; FWW, 18; HWL, 204; HWW, 10; HFL, 52; FTb, 47; FBstr, 16; MTb, 61; MBstr, 14; HTb, 78; HBstr, 20; METL, 81; METW, 77; Ext.OVL, 2; OVL, 51.

Male. Similar to female except for normal sexually dimorphic characters such as antenna and genitalia.

Material examined. INDIA: UTTAR PRADESH: Lakhimpur, Lakhkhi Purwa, Boodapahar; 1Female (on slide), 26.ix.2006, Coll. F.R.Khan.

Additional material examined: INDIA: KARNATAKA: Sringeri, Reserve Forest; 2 Female (on slides), vi. 2002, from ATREE (Ashoka Trust for Research in Ecology and the Environment) [determined by M. Hayat (ZDAMU)].

Hosts. Unknown.

Distribution. India; Karnataka, Uttar Pradesh.

Comments. The specimen recorded here were compared with their original description, figures given by Subba Rao (1989) and with the specimens present in ZDAMU and found conspecific with *Camptoptera matcheta*.

3. *Camptoptera assamensis* Rehmat & Anis

(Figures 100–106)

Camptoptera assamensis Rehmat & Anis, 2014a: 55, 56, Female. India, Assam (ZDAMU, examined).

Diagnosis

Female. Body length, 0.3 mm. Head (Fig. 100) with occipital area (Fig.101) having transverse reticulatio. Antennal scape and pedicel with longitudinal striations; pedicel 0.83x of F1 length; F1 longest; F4 and F5, F6 and F7 equal in length (Fig. 100); clava with 2 longitudinal sensilla. Mesosoma (Fig. 104), 1.2x as long as gaster; pronotum not visible in dorsal view of mesosoma; prosternum subpentagonal in shape and striate; notauli incomplete; mesoscutum with scale-like reticulations except posterior part with longitudinal cells; scutellum reticulate, middle to posterior part with longitudinal cells as in Fig. 105; propodeum with 'H'shaped carinae. Fore wing (Fig. 102) 20.6x as long as broad; disc with 7 setae in a row. Hind wing (Fig. 103) 30x as long as broad. Petiole (Fig. 104) with lateral projections; ovipositor not exserted (Fig. 106), 3.2x as long as metasoma length.

Colour. Body dark brown. Antenna light brown except scape with proximal part dark brown; F6, F7 and clava dark brown. Fore wing and hind wing infuscate at base. Posterior part of gaster dark brown. Legs yellow; coxae light brown.

Relative measurements (slide). HW, 45; SCL, 18; SCW, 4; PDL, 10; PDW, 7; FnL, 45; F1L, 12; F1W, 2; F2L, 1; F2W, 2; F3L, 11; F3W, 2; F4L, 9; F4W, 2; F5L,

9; F5W, 2; F6L, 10; F6W, 3; F7L, 10; F7W, 4; CL, 25; CW, 9; MESL, 55; MESW, 38; MSCL, 13; SCTL, 25; PDL, 28; FWL, 124; FFW, 6; FFL, 44; HWL, 120; HWW, 4; HFL, 36; FTb, 25; FBstr, 10; MTb, 42; HTb, 44; HBstr, 10; METL, 45; METW, 43; PETL, 7; OVL, 14.

Male. Unknown.

Material examined. *Holotype* Female (on slide): INDIA: ASSAM: Guwahati, Amingaon; 29.x.2008, Coll. F.R.Khan (ZDAMU, Registration No. HYM.CH. 677).

Hosts. Unknown.

Distribution. India: Assam.

Comments. *Camptoptera assamensis* is very close to *Camptoptera philippina* Taguchi, but differs by colour of antennal segments, F6, F7 and clava dark brown with two longitudinal sensilla, proximal part of scape dark brown; scutellum reticulate, middle to posterior part with longitudinal cells; prosternum striated; propodeum with 'H'shaped carinae without any setae. Fore wing 20.6x as long as broad (*C. philippina* have clava light brown with 4 longitudinal sensilla, pedicel and scape dusky brown; scutellum reticulated with three hexagonal cells ranged on each transverse line by which scutellum divided into two parts, the anterior part more densely cellulate than posterior part; prosternum reticulated; propodeum with 3 setae in the middle and bordered by a strong ridge; Fore wing 12.9x as long as broad).

4. *Camptoptera brevifuniculata* Subba Rao

Camptoptera brevifuniculata Subba Rao, 1989: 162, 183, Female. India, Tamil Nadu (BMNH, not examined).

Camptoptera brevifuniculata Subba Rao: Anis & Rehmat, 2013, 3: checklist. Manickavasagam & Rameshkumar, 2013, 563

Diagnosis

Female. Head with vertex striate; F1 longest, F3 subequal to F5 and F4 equals to F6 and F7, clava about 2.7x as long as F1 length and slightly longer than the combined length of last three funicle segments. Mesoscutum with transverse reticulations;

anterior scutellum smooth, posterior scutellum with reticulate sculpture along anterior margin andslightly elongated cells sculpture in the middle. Fore wing with 2–3 irregular rows of discal setae, longest marginal fringe about 7x as long as wing width. Metasoma shorter than mesosoma length; petiole with lateral projections; ovipositor not much exserted.

Colour. Body colour dark brown except funicle segment light brown. Fore wing infuscate distal to venation. Hind wing infuscate.

Male. Similar to female except for normal sexually dimorphic characters such as antenna and genitalia; longitudinal sesillum on all funicle segments.

Hosts. Unknown.

Distribution: India: Tamil Nadu.

Comments. Above diagnosis based on original description and figures given by Subba Rao (1989). This species is distinguished from *Camptoptera longifuniculata* Viggiani by the shape and measurements of the antennal segments; sculpture present on mesoscutum and scutellum.

5. *Camptoptera dravida* Subba Rao

(Figures 107–113)

Camptoptera dravida Subba Rao, 1989: 160–163, Female, India, Karnataka, Mudigere (BMNH, not examined).

Camptoptera dravida Subba Rao; Anis & Rehmat, 2013: 3, checklist. Manickavasagam & Rameshkumar, 2013: 563. Rehmat & Anis, 2014: 54–57, records.

Diagnosis

Female. Head (Fig. 107) with transverse striations on occipital area. Scape striated; pedicle longer than F1about 1.09x of F1 length; F3–F5 equal in length. Mesoscutum equal to scutellum, about 0.5x of scutellum length; mesoscutum, scutellum and propodeum with transverse striations. Fore wing (Fig. 108) with one row of discal setae, about 13.8x as long as broad. Hind wing (Fig. 109) 29.3x as long as broad.

Metasoma (Fig. 111) 0.96x of mesosoma length; ovipositor short not exserted at apex.

Colour. Body dark brown except proximal half of gaster pale. Antenna light brown. Wings hyaline. Legs light brown.

Relative measurements (slide): HW, 55; HL, 35; EH, 27; FVW, 40; TD, 5; TMMD, 13; DBT, 13; SCL, 19; PL, 12.5; PW, 8; CLL, 31; F1L, 11; F2L, 1; F3L, 10; F4L, 8; F5L, 10; F6L, 10; F7L, 9; MESL, 65; MSCL, 26; SCTL, 26; FWL, 138; FWW, 10; FFL 58; HWL, 132; HWW 4.5; HFL, 42; MTb, 43; MBstr 8; HTb, 45; HBstr, 8; HTrs, 29; METL, 63; OVL, 36.

Male. Antenna 10-segmented (Fig. 112).

Material examined. INDIA: UTTAR PRADESH, Sharawasti, Chakra Bhandar, 1Female (on slide), 3.x.2006, Coll. F.R. Khan; Aligarh, Shekha, 2Female, 2Male (on slides), 9.ix.2007, Coll. F. R. Khan; Aligarh, Department of Zoology, 1Female (on slide), 4.iv.2011. Coll. T. Rehmat; UTTARAKHAND, Ranikhet, Chaubatia, 3Female (on slides), 27.x.2009, Coll. F.R.Khan; Dehradun, Forest Research Institute, 1Female (on slide), 04.xi.2009, Coll. F.R.Khan.

Hosts. Unknown.

Distribution. India: Karnataka, Tamil Nadu, Uttarakhand, Uttar Pradesh.

Comments. The specimens recorded here were compared with the original description and figures given by Subba Rao (1989) and found to be conspecific with *C. dravida.*

6. *Camptoptera minorui* Taguchi

(Figures 114–119)

Camptoptera minorui Taguchi, 1971: 49–51, Female. Japan, Matsuyama (ELEU, not examined).

Redescription

Female. Body length, 0.45 mm.

Head (Fig. 114) with frontal trabecula undivided. Antennal scape 1.6x of pedicel, pedicel with longitudinal striations; F3 longest, F1, F4–F7 almost equal in length; clava broader than pedicel, with four longitudinal sensilla.

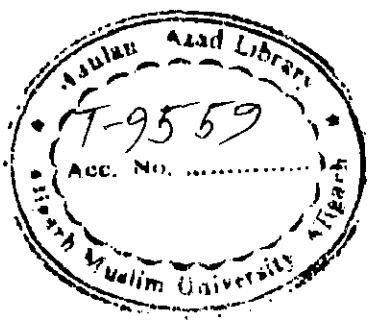
Mesosoma (Fig. 118), 0.9x as long as metasoma, pronotum covered by mesoscutum except lateral part; prosternum pentagonal, visible from dorsal side, axilla densely reticulated each with a seta; and with a pair of seta, notauli deep broad and complete; mesoscutum smaller than scutellum with reticulations having hexagonal cells, scutellum covered with reticulations; mesophragma length equals to mesoscutum; propodeum almost equals to mesoscutum sculptured with reticulations 5–6 teeth-like projections present medially; toothed area without any sculpture. Fore wing (Fig. 116) 15.8x longer than broad with a row of setae in the middle of the disc; subcoastal vein with 12 tubercles in the distal part. Hind wing (Fig. 117), 42 x as long as broad; longest marginal fringe 13.6x as long as the wing length. Hind tibia longest.

Metasoma (Fig. 119). T1 longest 5.3x as long as the gaster; petiole (Fig. 119). Smooth on dorsal surface, lateral projections absent, sculpture present on ventral and lateral side; ovipositor exserted about one half of gaster length.

Colour. Black except anterior part of gaster. Antenna dark brown. Forewing lightly infuscate at basal part and hyaline in apical part. Hind wings infuscate. Legs with coxae light brown; tarsi yellowish brown.

Relative Measurements: (slide): DBT, 18; SCL, 32; SCW, 6; PL, 14; PW, 9; CLL, 46; CLW, 10; F1L, 15; F1W, 3; F2L, 1; F2W, 3; F3L, 20; F3W, 3; F4L, 14; F4W, 3; F5L, 15; F5W, 4; F6L, 15; F6W, 5; F7L, 14; F7W, 5; MESL, 74; MSCL, 22; SCTL, 30; MesoPL, 22; PDL, 20; FWL, 222; FWW, 14; FFL, 93; HWL, 210; HWW, 5; HFL, 68; FFm, 40; FTb, 43, FTrs, 51 ; FBstr, 15 ; MFm, 45; MTb, 57; MTrs, 52 ; HFm, 51; HTb, 70; HTrs, 74; HBstr, 22; METL, 80; METW, 65; PETL, 12; OVL, 40.

Male. Unknown.



Material examined. INDIA: WEST BENGAL, Darjeeling, Gorabari, 4 Female (on slides), 15.vi.2008, Coll. F.R. Khan; UTTAR PRADESH, Udham Singh Nagar, Tanda, 1 Female (on slide), 22.x.2009, Coll. F.R. Khan.

Hosts. Unknown.

Distribution: India **(Present record):** Uttar Pradesh, West Bengal (Japan).

Comments. It is the first record from India, previously described by Taguchi (1971) from Japan and distinguished by other Indian species of the Genus *Camptoptera* on the basis of mesosoma fully sculptured with transverse reticulations, peculiar sculptures on petiole and propodeum. Specimens examined by author in present work were compared with the original description and figures given by Taguchi (1971) and found to be conspecific with *Camptoptera minorui*.

7. *Camptoptera alanuda* sp. nov.

(Figures 120–126)

Description

Female. Body length, 0.43 mm.

Head with transverse reticulations on occipital area, orbital trabeculae strong, each divided into six small pieces; transofrontal trabecula undivided. Mandibles unidentate. Antenna (Fig. 120) longer than body; pedicel longer than F1 about 1.25x of F1 length.

Mesosoma (Fig. 124) with transverse reticulation and 2 pairs of setae; mesoscutum almost shorter than scutellum (20:28) with transverse reticulations, parasidal furrows complete with, each with a submarginal seta; Anterior scutellum without any cells; posterior scutellum with longitudinal cells as in fig.124; propodeum smooth and transversally reticulated. Fore wing (Fig. 121) with disc bare, 22x as long as broad. Hind wing (Fig. 123) 40 x as long as broad.

Metasoma (Fig. 126) 0.8x of mesosoma length; petiole (Fig. 125) ridged without any lateral projections; ovipositor small not much exserted.

Colour. Body brown except petiole dark brown and legs light brown. Fore wing infuscate at base; hyaline in apical half. Hind wing infuscate.

Relative measurements (slide): TMMD, 25; DBT, 13; SCL, 40; SCW, 7; PL, 15; PW, 10; CLL, 44; CLW, 10; F1L, 12; F1W, 5; F2L, 1; F3L, 19; F3W, 2; F4L, 15; F4W, 3; F5L, 15; F5W, 3; F6L, 15; F6W, 4; F7L, 15; F7W, 5; MESL, 73; MSCL, 20; SCTL, 28; Meso. PL, 17; PDL, 24; FWL, 220; FWW, 10; FFL, 95; HWL, 200; HWW, 5; HFL, 70; FFm, 60; FTb, 40, FTrs, 50; FBstr, 6; METL, 82; PETL, 15; OVL, 39; Ext. OVL, 4.

Male. Unknown.

Material examined. *Holotype* Female (on slide): INDIA: HIMACHAL PRADESH: Mandi, Gutkar, 22.vi.2006, Coll. S.M. A. Badruddin & F.R. Khan.

Hosts. Unknown.

Distribution. India: Himachal Pradesh.

Etymology. The species name is derived from the bare disc of the fore wing [ala= wing; nudus= nude].

Comments. It was described by Taguchi (1971) from Japan. The species is distinguished from other Indian species of *Camptoptera* on the basis of mesosoma fully sculptured with transverse reticulations, peculiar sculptures on petiole and propodeum. Specimens examined by me in present work were compared with the original description and figures given by Taguchi (1971).

8. ***Camptoptera okadomei*** Taguchi

(Figures 127–132)

Camptoptera okadomei Taguchi, 1972, 40(4): 224–226, Female. Philippines (ELNJ, not examined).

Redescription

Female. Body length, 0.24 mm.

Head. Occipital region with transverse striations; supra orbital trabeculae divided into 3 small pieces; transverse trabeculae undivided. Mandibles unidentate and sharp. Antenna as in Fig. 127; scape and pedicel with faint longitudinal striations, scape longer than pedicel (16:10), about 1.6x as long as pedicel; pedicel 0.8x of F1

length (10:12); F1 subequal to F3; F4, F5, F6 and F7 are almost equal, clava 4.2x as long as broad.

Mesosoma (Fig. 130 & 131) 1.3x of metasoma length; pronotum not visible in dorsal view of thorax; prosternum pentagonal, not closed by cervicalia; incomplete notauli. Mesoscutum with transverse striations forming transverse cells occasionally, anterior scutellum including axillae reticulated, each axillar seta reaching half of the posterior scutellum, posterior scutellum with longitudinal striations, forming longitudinal cells occasionally. Propodeum (Fig. 131) with two U-shaped carinae reaching to the anterior margin of the propodeum medially. Fore wing (Fig. 128) 17.2 x as long as broad, with 3 rows of setae (one in the middle row contains 10–12 discal setae and one row each along anterior and posterior margin of wing); three short setae and a long seta below venation. Hind wing (Fig. 129) 28x as long as broad.

Metasoma (Fig. 132). Petiole smooth with long lateral projections; ovipositor 0.73x of gaster length and slightly exserted.

Colour. Brown except petiole and distal half of gaster dark brown; antenna light brown. Fore wing hyaline with an infuscated band beyond venation. Hind wing hyaline.

Relative measurements (slide): SCL,16; SCW, 7; PL, 10; PW, 7; CLL, 30; CLW, 7; F1L, 12; F1W, 2; F2L, 1; F2W, 2; F3L, 11; F3W, 3; F4L, 9; F4W, 3; F5L, 8; F5W, 4; F6L, 8; F6W, 5; F7L, 9; F7W, 6; MESL, 50; MESW, 50; MSCL, 14; SCT, 20; PDL, 10; Meso. PL, 7; FWL, 138; FWW, 8; FFL, 50; HWL, 115; HWW, 4; HFL, 40; FFm, 27; FTb, 27, FTrs, 30; FBstr, 10; HTb, 45; HTrs, 45; HBstr, 10; METL, 38; PETL, 10; OVL, 28; Ext. OVL, 3.

Male. Unknown.

Material examined: INDIA: ASSAM, Guwahati, Borkusi, 1 Female and 1Male (on slides), 28.x.2008, Coll. F.R.Khan.

Hosts. Unknown.

Distribution: India **(present record)**: Assam (Philippines).

Comments: It is the first record from India, previously described by Taguchi (1972) from Philippines and distinguished from other Indian species of the Genus *Camptoptera* on the basis of mesosoma sculpture and propodeum carinae. Specimens examined by author in present work were compared with the original description and figures given by Taguchi (1972) and found to be conspecific with *Camptoptera okadomei*.

9. *Camptoptera cardigastra* sp. nov.

(Figures 133–138)

Description

Female. Body length, 0.32 mm.

Head (Fig.133). Occipital region with transverse striations, superaorbital trabeculae divided into 8 samll pieces; transversofrontal trabeculae undivided; mandibles unidentate. Antenna (Fig. 133). Scape and pedicel with longitudinal striations; scape 1.3x longer than pedicel, F1equal to F3, F4 equal to F5 and F6 almost equal to F1 in length, clava 3x as long as broad with two longitudinal sensilla and equals to the combined length of scape and pedicel.

Mesosoma (Fig. 137). Pronotum not visible in dorsal view of mesosoma, prosternum smooth and pentagonal in shape, mesoscutum with striations, incomplete notauli; axilla with long seta reaching to the half of the length posterior scutellum; scutellum with transverse reticulations laterally and large hexagonal cells medially as in fig. 137; metanotum visible dorsally; propodeum with a pair of very strong seta, carinae well developed as in fig. 137. Fore wing (Fig. 134), 19.7x longer than broad, with four rows of setae, 2 rows of discal setae beyond venation, one row each along anterior and posterior margin and one long and 2 small setae below venation as in fig. 135. Hind wing (Fig. 136) 23.3x as long as broad.

Metasoma (Fig.138) 1.3x length of mesosoma; petiole with lateral projections well developed; ovipositor not exserted originates from half of the gaster length.

Colour. Body brown except petiole and gaster dark brown. Fore wing with two bands of infuscation, one just beyond venation another towards apex and covers 1/6 part of fore wings length. Hind wings infuscate at the base. Legs yellow.

Relative measurements (slide): DBT 17; EH, 26; SCL, 17; SCW, 6; PL, 13; PW, 7; CLL, 30; CLW, 10; F1L, 13; F1W, 2; F2L, 1; F2W, 2; F3L, 13; F3W, 2.5; F4L, 11; F4W, 3.5; F5L, 11; F5W, 3.5; F6L, 10; F6W, 4; F7L, 10; F7W, 5; THL, 65; MSTL, 8; SCTL, 30; Meso. PL, 9; PDL, 12; FWL, 178; FWW, 9; FFL, 70; HWL, 140; HWW, 6; HFL, 57; FFm, 35; FTb, 32; FTrs, 55; FBstr, 12; MFm, 38; MTb, 48; MTrs, 55; HFm, 35; HTb, 50; HTrs, 65; HBstr, 14; METL, 50; PETL, 18; OVL, 25.

Male. Unknown.

Material examined. *Holotype* Female (on slide under 2 coverslips): INDIA: ORISSA: Puri Chandanpur, 29.xi.2007, Coll. F.R. Khan.

Hosts. Unknown.

Distribution. India: Orissa.

Etymology. The species name is derived from heart shaped of the gaster.

Comments. This species is closely resembles to *Camptoptera okadomei* Taguchi (1972) by measurement of funicle segments, longitudinal striation on scape and pedicel, mesoscutum with transverse striations and incomplete notauli, shape of propodeum carinae, petiole with lateral projections well developed, but differ by characters as follows: clava subequal to combined length of scape and pedicel, fore wing having 4 rows of setae beyond veination, one long and two small setae below venation, sculpture on scutellum having reticulations laterally and large hexagonal cells medially, ovipositor not exserted (In *C. okadomei*: clava shorter than combined length of scape and pedicel, basal part of fore wing with 4 short setae and a long seta below venation, scutellum including axillae reticulate anteriorly but longitudinally striate posteriorly, ovipositor slightly exserted).

10. *Camptoptera fusca* sp. nov.

(Figures 139–146)

Description

Female. Body length (Holotype), 0.28 mm.

Head (Fig. 139) Frontal region sculptured with transverse reticulations, orbital trabeculae strong and divided into seven pieces while transversofrontal trabeculae divided into five pieces. Occipital area with transverse reticulations and a central groove. Face with 4+4 pairs of strong setae, having V-shaped reticulationa as in fig. 139. Antenna (Fig. 140). Scape, 1.6 x as long as pedicel length, F1 subequal to F3 (longest), F4–F7 almost equal in length but increasing in width. Clava, 1.6x as long as scape (shorter than combined length of last three funicle segments), with 2 longitudinal sensilla.

Mesosoma (Fig. 144, 145). Pronotum not visible in dorsal view, prosternum subpentagonal in shape; axilla with a seta each, notauli incomplete. Mesoscutum (shorter than scutellum) with fine reticulations, scutellum with cellulate reticulations.; about 8 tooth like projections on posterior slope of the propodeum with almost U-shaped carinae as in fig. 145. Fore wing (Fig. 141), 19 x (paratypes=21.4x) as long as broad with 3 rows of discal setae, middle row contains 12 setae, a row towards posterior and anterior margin each; one long and one short seta just below venation; subcoastal vein with 11 tubercles in the distal part as in fig. 142. Hind wing, 31.5x as long as broad; longest marginal fringe, 8x as long as the wing length. Mid and Hind tibia subequal.

Metasoma (Fig. 146). Ovipositor 1.6x (in paratypes = 0.7x) of gaster length, slightly exserted 0.06x as long as its own length. Petiole (Fig. 145). Smooth on dorsal surface, with lateral projections; ovipositor and hind tibia ratio is 0.75:1.

Colour. Body dark brown except antenna and legs light brown, Fore wings infuscate at base and hyaline towards apex. Hind wings sub hyaline.

Relative Measurements (slide): FVW, 30; DBT, 15; SCL, 18; SCW, 5; PL, 11; PW, 6; CLL, 30; CLW, 8; F1L, 8; F1W, 2; F2L, 2; F2W, 2; F3L, 10; F3W, 2; F4L,

8; F4W, 2; F5L, 9; F5W, 3; F6L 8; F6W, 4; F7L, 9; F7W, 5; MESL, 52; MSCL,13; SCTL, 26; MesoPL, 12; PDL, 13; FWL, 135; FWW, 7; FFL, 35; HWL, 125; HWW, 4; HFL, 32; FFm, 30; FTb, 32, FTrs, 35; FBstr, 8; MFm, 30; MTb, 42; MTrs, 40; HFm, 25; HTb, 42; HTrs, 45; HBstr, 10; METL, 50; PETL, 11; OVL, 30.

Male. Unknown.

Material examined. *Holotype* Female (on slide) INDIA: KERALA: Ernakulam, Amballur, 10. i. 2012. Coll. F.R. Khan.
Paratypes Female INDIA: UTTAR PRADESH: Aligarh, Department of Zoology (LT), 2Female (on slides), 29.x.2011, Coll. T. Rehmat.

Hosts. Unknown.

Distribution: India: Kerala, Uttar Pradesh.

Etymology. The specific name drived from the dark brown colour of the holotype.

Comments. This species shows resembles to *Camptoptera denticularis* sp. nov. described above by having F1 subequal to F3 (longest), F4–F7 almost equal in length but width increases forwardly, clava 1.6 x as long as scape with two longitudinal sensilla and petiole with lateral projections, but differ by some characters as follows: frontal region with 4+4 pairs of strong setae, having V-shaped reticulated sculpture; scape, 1.6x as long as pedicel; 8 teeth like projections on posterior slope of the propodeum with U-shaped carinae. Fore wing 19x longer than broad with 3 rows of discal setae, a long and a short seta just below venations; hind wing, 31.5x as long as broad [In *C.denticularis* sp. nov.: frontal region with transverse reticulations, having 5 pairs of setae, scape 2x as long as pedicel; propodeum having 15–17 teeth like projections medially without any carinae. Fore wing 15x as long as wide, one strong seta below marginal vein, disc beyond venation bare, three rows of setae, middle row (discal setae irregularly arranged) covers 2/3 of wing length towards apex and one row each along anterior and posterior margin)].

11. *Camptoptera sakaii* Taguchi

(Figures 147–152)

Camptoptera sakaii Taguchi, 1977: 143–146, Female. Taiwan, Kenting Park (ELEU, not examined).

Camptoptera sakaii Taguchi, 1977, Anis & Rehmat, 2013: 3, checklist, Rehmat &Anis, 2014: 55, 57, key, redescription, figures & records.

Diagnosis

Female. Head (Fig. 147). Occipital area with transverse reticulations. Antenna with scape and pedicel striated; clava with two longitudinal sensilla reaching apex; F1 subequal to pedicel; F3 longest (Fig.). Mesosoma (Fig. 149). mesosoma and gaster equal in length; pronotum not visible in dorsal view of thorax; mesoscutum shorter than scutellum and with transverse reticulations; notauli complete reaching towards posterior margin of mesoscutum, postscutellum laterally and posteriorly with elongated cells as in fig. 150; propodeum with 7–10 tuberculi and 'W' shape carinae. Fore wing (Fig. 151), 12.2x as long as broad with distal macrochaeta strong and with 9 tubercles on subcostal vein; two rows of setae on disc. Hind wing 30.6x as long as broad. Metasoma (Fig. 152) subequal to mesosoma; petiole with 'Y' shaped carina on dorsal surface. Ovipositor not exserted about 0.5x of mid tibia length.

Colour. Body dark brown. Antenna light brown, except scape and pedicel honey yellow. Fore wing infuscate at base, and with a triangular patch below stigmal vein. Hind wing infuscate. Legs yellowish brown.

Relative measurements (slide): SCL, 25; SCW, 7; PL 12; PW, 9; FnL, 106; CLL, 42; FnL, 135; F1L, 12; F2L, 1; F3L, 18; F4L, 15; F5L, 14; F6L, 13; F7L, 13; MESL, 75; MSCL, 24; SCTL, 33; FWL, 196; FWW, 16; FFL, 84; HWL, 184; HWW, 6; HFL, 48; FTb, 40; FBstr, 15; MTb, 60; MBstr, 15; HTb, 60; HBstr, 20; METL, 80; METW, 65; PETL, 18; OVL, 34.

Male. Unknown.

Material examined. INDIA: ASSAM, Kamrup, Boodapahar, 4Females (on slide), 30.x.2008, Coll. F.R. Khan.

Hosts. Unknown.

Distribution. India: Assam. (Taiwan).

Comments. The specimens listed above agree fairly well with the original description and figures given for *Camptoptera sakaii* by Taguchi (1977). This species is recently recorded from India by Rehmat & Anis (2014). It differs from other Indian species by the characters given in the key.

12. *Camptoptera franciscae* (Debauche)

(Figures 153–157)

Sphegilla franciscae Debauche, 1948: 63–65. Belgium (not examined).

Sphegilla japonica Taguchi, 1971: 49–59, Female. Japan (ELNJ, not examined). Synonymized by Triapitsyn (2014).

Camptoptera japonica (Taguchi): Huber & Lin, 1999.

Camptoptera franciscae (Debauche): Triapitsyn, 2014: 27–33.

Redescription (Indian specimens)

Female. Body length, 0.36 mm.

Head. Frontal region sculptured with transverse reticulations. Occipital area with transverse reticulations and a central groove. Face with 4+4 pairs of strong setae, having V-shaped reticulations. Antennal scape (Fig. 153) longer than pedicel (16:12), with a long seta; F3 longest, F4–F7 almost equal in length but increasing in width; clava 2x as long as scape, with 2 longitudinal sensilla.

Mesosoma (Fig. 156). Pronotum not visible in dorsal view, prosternum subpentagonal in shape; axilla with a seta each, notauli deep, broad and complete. Mesoscutum almost equal to scutellum with fine horizontal striations and scutellum with longitudinal striations forming V-shaped sculpture (some areas remain blank in fig. 156 of scutellum due to hardly visible sculptures). Tooth like projections in parallel longitudinal rows on posterior slope of the propodeum. Fore wing (Fig. 154)

venation cutting into two distally; subcoastal vein with nine tubercles on the distal part as in fig. 155. Hind wing as long as forewings (137:139).

Metasoma (Fig. 157). Broader than long and smaller than mesosoma; petiole without any sculpture, wider than long ovipositor about half of the metasoma length; cercal setae long.

Colour. Dark brown except scape, pedicel, F1, legs, pedicel and anterior part of gaster light brown. Fore wing infuscate at the base and hyaline at apex. Hind wing infuscate.

Relative Measurements (Slide): HL, 32; HW, 45; POL, 18; DBT, 12; SCL,16; SCW,6; PL, 12; PW,7; CLL, 35;CLW, 7; F1L, 5; F1W, 2; F2L, 1; F2W, 2; F3L, 12; F3W, 2; F4L, 11; F4W, 3; F5L,10; F5W, 4; F6L, 10; F6W, 4; F7L,10; F7W, 5; MESL, 65; MSCL, 24; SCTL, 26; MesoPL, 15; PDL, 14; FWL, 139; FWW, 8; FFL, 65; HWL, 137; HWW, 3; HFL, 42; FFm, 30 ; FTb, 32; FTrs, 43; FBstr, 8; MFm, 35; MTb, 45; MTrs, 40; HFm, 35; HTb, 45; HTrs, 40; HBstr, 8; METL, 62; METW, 58; PETL, 6; PETW, 8; OVL, 30.

Male. Unknown.

Material examined: INDIA: UTTARAKHAND, Ranikhet, Chaubatia, 4 Female (on slides), 27.x.2009, Coll. F.R.Khan; UTTAR PRADESH, Aligarh, Department of Zoology (LT), 1Female (on slide), 29.x.2011, Coll. T. Rehmat.

Hosts. Unknown.

Distribution. India **(Present record)**: Uttarakhand, Uttar Pradesh. [(Austria, Belgium, Bulgaria, China, Japan and Russia (Triapitsyn 2014)].

Comments: It is new record from India. Firstly *Camptoptera japonica* was described by Taguchi (1971) as *Sphegilla japonica*, later it was placed in *Camptoptera* by Huber & Lin (1999). Identifying characters of this species as follows: broken venation of fore wing into two parts distally and the sculpture of propodeum with teeth like projections in parallel longitudinal rows on posterior slope.

13. *Camptoptera kannada* Subba Rao

Camptoptera kannada Subba Rao, 1989: 163-164, Female, Male. India, Karnataka, Mudigere (BMNH, not examined).

Camptoptera kannada Subba Rao: Anis & Rehmat, 2013: 3, checklist. Manickavasagam & Rameshkumar, 2013: 563, checklist.

Diagnosis

Female. Head with frontal trabeculae undivided; ocellar area transversly striate; scape about 2x as long as pedicel length, F3 longest, F1 subequal to F4 and F4 equals to F5 and F6 sligthly longer than F7, clava about 3.6x as long as F1 length and much longer than the combined length of last three funicle segments. Mesoscutum with transverse reticulations anteriorly and cellulate towards posterior; notauli deeply notched; propodeum with cellulate sculpture and 1+1 setae. Fore wing with 3 rows of discal setae, middle row having 10 setae and each row along wing margin with 18–20 setae; longest marginal fringe about 8x as long as wing width. Hind wing with longest marginal fringe about 12x as long as wing width. Legs normal, fore tibia with a few strong peg-like setae. Metasoma longer than mesosoma length; petiole short, unridged and smooth.

Colour. Body dark brown. Fore wing and Hind wing infuscate uniformly.

Male. Unknown.

Hosts. Unknown.

Distribution: India: Karnataka

Comments. Above diagnosis based on original description and figures given by Subba Rao (1989). It differs from other Indian species by characters given in the key.

14. *Camptoptera ambrae* Viggiani

Camptoptera ambrae Viggiani, 1978: 152, 153, Female. India, Tamil Nadu (MHNG, not examined).

Camptoptera ambrae Viggiani, 1978: Anis & Rehmat, 2013: 3, checklist. Manickavasagam & Rameshkumar, 2013: 563, checklist. Rehmat & Anis, 2014: 55, key.

Diagnosis

Female. Head with frontal trabecula undivided; occipital area transversely striate. Antenna with slender and curved scape; pedicel as long as the F1; F3 suequal to F1; F4–F7 longer than broad; clava slightly longer than the combined length of last three funicle segments. Mesosoma subequal to metasoma; transverse reticulations on mesoscutum and scutellum; propodeum smooth with two median carinae, having a long subspiracular seta. Fore wing about 14x as long as wide, marginal fringe about 5x as long as wing width. Marginal vein with distal macrocheta 2x as long as wing width. Fore wing disc with two rows of setae towards anterior and posterior margin and one row in the middle of the disc. Legs with posterior coxae having reticulate sculpture. Petiole with lateroventrally ridged; ovipositor originate from base of the metasoma and not much exserted.

Colour. Body colour dark brown except antenna and legs light brown.

Male. Unknown.

Hosts. Unknown.

Distribution: India: Tamil Nadu.

Comments. The above diagnosis is based upon original description and figures given by Viggiani (1978). This species is distinguished from other known species of the genus by the following characters; shape and measurements of the antennal segments; setae present on mesosoma and propodeum, sculpture present on mesoscutum, scutellum, propodeum and petiole.

15. *Camptoptera longifuniculata* Viggiani

Camptoptera longifuniculata Viggiani, 1978: 163-164, Female. India, Tamil Nadu, Mudigere (MNHG, not examined).

Camptoptera longifuniculata Viggiani: Anis & Rehmat, 2013: 3, checklist. Manickavasagam & Rameshkumar, 2013: 563, checklist. Rehmat & Anis, 2014: 55, key.

Diagnosis

Female. Head with frontal trabeculae undivided; occipital area transversly reticulate. Mandibles long, narrow and curved. Scape about 2x as long as pedicel, F3 longest, F1 subequal to F3 and F4–F7 subequal in length, clava about 1.75x as long as F1 length and shorter than the combined length of last three funicle segments [measurement of antennal segment F7 missing, but seems equal to F6 through illustrations given by Viggiani, 1978 (Fig. 1, page no. 153)]. Mesosoma longer than metasoma; mesoscutum and scutellum with transverse reticulations, notauli well developed; scutellum with reticulate sculpture posteriorly with cell ending in a denticle; propodeum long, smooth, with two median carinae and 4 microsetae medially; subspiracular setae long reaching to the base of the hind coxae. Fore wing with venation reaching to one third of the wing length; three rows of discal setae, one middle row and two submarginal rows. Legs normal. Petiole smooth with lateral projections; ovipositor not exserted.

Colour. Body dark brown except scape and legs yellowish brown.

Male. Unknown.

Hosts. Unknown.

Distribution: India: Tamil Nadu.

Comments. The above diagnosis is based upon original description and figures given by Viggiani (1978). This species is closely related to *Camptoptera phillipina* Taguchi, *Camptoptera yamagishii* Taguchi, and *Camptoptera reticulata* Ogloblin, but differ by the sculpture on scutellum and the shape of propodeum sculpture.

16. *Camptoptera aligarhensis* sp. nov.

(Figures 158–162)

Description

Female. Body length, 0.27 mm.

Head (Fig.158). Frontal region sculptured with transverse reticulations. Occipital area with transverse reticulations. Face with 4+4 pairs of strong setae, having V-shaped reticulations as in fig. 158. Antennal scape longer than pedicel (20:14), both with longitudinal striations; F1–F3 equal, F4–F7 almost equal in length but increasing in width. Clava (Fig. 159) 1.85x as long as scape, with 2 longitudinal sensilla.

Mesosoma (Fig. 161) Prosternum pentagonal in shape; axilla with a seta each, notauli incomplete. Mesoscutum with fine reticulations having a denticle at the end of each cell; scutellum with longitudinal reticulations meeting occasionally in middle. About 15 tooth like projections on posterior slope of the propodeum as in fig. 161.

Fore wing (Fig. 160) 17x as long as broad with 3 rows of discal setae, middle row covers 1/4 of wing length towards apex and contains 5 setae, one row starting just beyond venation towards posterior and anterior margin each, in proximal half of wing; subcoastal vein with 10-11 tubercles in the distal part. Hind wing, 33x as long as broad; longest marginal fringe about 8x as long as the wing length. Mid and Hind tibia equal in length.

Metasoma (Fig. 162). Ovipositor about 0.5x of gaster length, not exserted. Petiole (Fig. 162). Smooth on dorsal surface, with lateral projections; ovipositor and hind tibia ratio is 0.5:1.

Colour. Body light brown. Fore wing infuscate at base and hyaline towards apex. Hind wing sub hyaline. Petiole dark brown and legs yellowish.

Relative Measurements: (slide): FVW, 28; DBT, 13; SCL, 20; SCW, 5; PL, 14; PW, 8; CLL, 37;CLW, 7; F1L, 15; F1W, 3; F2L, 2; F2W, 1; F3L, 15; F3W, 3; F4L, 11; F4W, 3; F5L, 11; F5W, 3; F6L, 10; F6W, 5; F7L, 9; F7W, 5; MESL, 50; MSCL,

15; SCTL, 24; MesoPL, 11; PDL 22; FWL, 153; FWW, 9; FFL, 68; HWL, 132; HWW, 4; HFL, 42; FFm, 35; FTb, 38, FTrs, 48; FBstr, 10; MFm, 35; MTb, 50; MTrs, 45; HFm, 40; HTb, 50; HTrs, 50; HBstr, 16; METL, 50; PETL, 7; OVL, 25.

Male. Unknown.

Material examined. *Holotype* Female (on slide) INDIA: UTTAR PRADESH, Aligarh, Department of Zoology (YPT), 25.x.2012; Coll. T. Rehmat.

Hosts. Unknown.

Distribution: India: Uttar Pradesh.

Etymology. The species is named after the collection locality from where the holotype was collected.

Comments. *Camptoptera aligarhensis* sp. nov. closely resembles to *Camptoptera denticularis* sp. nov. but differ by notauli incomplete F1–F3 equal, F4–F7 almost equal in length but increasing in width, scutellum reticulations occasionally meeting in the middle, middle row of the fore wing contains 5 discal setae (covers 1/4 of wing length towards apex), ovipositor about 0.5x of gaster length, not exserted (In *C. denticularis* sp. nov.: scutellum with transverse reticulations laterally and medially forming a V-shaped sculpture of reticulations at the anterior half of scutellum, middle row of fore wing with irregularly arrange 10–12 setae and covered 2/3 of wing length, ovipositor about 0.6x of metasoma length).

17. *Camptoptera denticularis* sp. nov.

(Figures 163–168)

Description

Female. Body length, 0.39 mm.

Head. Occipital region with transverse striations. Face with fine transverse reticulation and 5 pairs of setae, posterior ocelli close to the supraorbital trabecula; distance between toruli almost equal to distance between posterior ocelli. Antenna (Fig. 163). Scape and pedicel with faint longitudinal straiations; scape about 2x longer than pedicel. F1,1.6 x longer than pedicel and almost equal to F3, F4 to F7

almost equal in length but width increases forwardly, F3 longest, clava 1.7x as long as scape, almost equal to combined length of F1–F3 with 2 longitudinal sensilla.

Mesosoma (Fig. 166 & 167). Pronotum small not visible in dorsal view of thorax, prosternum with transverse reticulations; mesosoma length greater than metasoma; medial lobe of mesoscutum having reticulations with hexagonal cells anteriorly and conical cells ending in a denticle at posterior region, lateral lobes with transverse reticulations having long cells without denticle and a pair of small setae; axilla having 2 pairs of setae with transverse reticulations, scutellum with transverse reticulations laterally and medially forming a V-shaped sculpture of longitudinal reticulations at the anterior half of scutellum as in fig 166. Propodeum smooth with two median carinae and 15–17 tooth like projections in the middle. Fore wing (Fig. 164) 15 x as long as broad with 8 tubercles on subcostal vein, one strong seta below marginal vein, some part of disc beyond venation bare, three rows of discal setae, middle row with irregularly arrange setae and covers 2/3 of wing length from apex and a row of discal setae each towards anterior and posterior margin. Hind wings (Fig. 165) infuscate at base and about 25x as long as wide.

Metasoma (Fig. 168) 0.78x smaller than mesosoma length; petiole smooth (Fig. 167) with lateral projections; ovipositor (encapsulated) about 0.6x of gaster length as in fig. 168.

Colour. Body brown except posterior part of gaster and petiole dark brown; antenna legs and head light brown. Wings infuscate.

Relative measurements (slide): TL, 4; SCL, 24; SCW, 51; PL, 12; PW, 6; CLL, 43; F1L, 20; F1W, 2; F2L, 1; F3L, 21; F3W, 2; F4L, 14; F4W, 2; F5L, 12; F5W, 3; F6L, 13; F6W, 4; F7L, 11; F7W, 5; MESL, 68; MSCL, 44; SCTL, 42; PDL 20; Meso. PL, 18; FWL, 180; FWW, 12; FFL, 63; HWL, 150; HWW, 6; HFL, 50; FFm, 41; FTb, 45, FTrs, 50; FBstr, 10; MFm, 50; MTb, 58; MTrs, 50; MBst,r 11; HFm, 43; HTb, 60; HTrs, 46; HBstr, 10; METL, 47; PETL, 9; OVL, 30.

Male. Unknown.

Material examined. *Holotype* Female (on slide): INDIA: UTTAR PRADESH: Aligarh, Department of Zoology (LT), 4.iv.2011, Coll. T. Rehmat.

Paratypes: 1 Female (on slide) INDIA: UTTARKHAND: Kashipur, Pipalia, 24.x.2009, Coll; Roorkee, Delda, 1Female (on slide), 2.xi.2009, Coll. F.R. Khan.

Hosts. Unknown.

Distribution. India: Uttrakhand, Uttar Pradesh.

Etymology. The species name is derived from the the sculpture of mesoscutum having conical cells ending with a denticle.

Comments: *Camptoptera denticularis* sp. nov. appears to be very close to *C. longifuniculata* Viggiani (1978) but differ by having clava subequal to combined length of last three funicle segments, sculpture on mesoscutum with conical cells ending with a denticle towards posterior margin of mesoscutum, scutellum with transverse reticulations laterally and medially forming a V-shaped sculpture of longitudinal reticulations towards anterior half of scutellum and propodeum with 15–17 teeth like projections or microsetae medially (In *C. longifuniculata:* clava longer than the combined length of last three funicle segments; transverse reticulation on mesoscutum and scutellum with transverse reticulations, and posteriorly having cells ending with a denticle on scutellum; propodeum with 4 teeth like projections or microsetae medially).

5. Genus *Eofoersteria* Mathot

(Figures 169–174)

Eofoersteria Mathot, 1966:231, Type species *Eofoersteria camptopteroides* Mathc by original designation.

References. Huber & Lin, 1999: 37, world review.

Diagnosis

Female. Body length, 0.25–0.32 mm. Head with mandibles unidentate, point sharply. Median vertical groove extending from foramen to vertex on occiput a transverse groove extending to lateral margin of head below eye. Antenna segmented (formula 1161), without ring-like segment (Fig.169); clava enti Mesosoma (Fig. 172). Prosternum pointed anteriorly. Scutellum without transve row of fovea. Propodeum mostly about half the length of scutellum, someti carinae present. Fore wing narrow but distinctly curved. Proximal macrochae absent, distal macrocheta short. Tarsi 4-segmented. Metasoma (Fig. 173). Oviposi not exserted to slightly exserted, mostly originate from middle of the gaster.

Colour. Body colour dark brown except antennal segments and legs light brov Fore wing with slightly infuscation at the base, rest hyaline. Hind wing subhyaline

Male. Unknown.

Hosts. Unknown.

Distribution. Australia, India, Zaire.

Species. World, 4 species. India, two species (including one new species in pres work).

Comments. The genus *Eofoersteria* Mathot (1966) belongs to the *Camptopt* group of genera. It is distinguished from other genera in the group as follo funicle 6-segmented, without a ring-like segment and 4-segmented tarsi, with apical two segments almost fused. *Eofoersteria* is very similar to *Camptopt* Foerster with reduced or apparently reduced numbers of antennal and ta segments. Currently the genus is represented worldwide by three species (No 2014), of which only one species *E. secunda* Viggiani (1978) is known from Indi

describe a new species from India based on a specimen collected in Manipur and provide a key to the world species of *Eofoersteria*.

Key to world species of Genus *Eofoersteria* (females)

1. Fore wing with only one row of discal setae; propodeum with carinae and sculpture (Viggiani,1978; Fig. 3) 2
-. Fore wing with more than two rows of discal setae; propodeum smooth (Mathot, 1966; Fig. 9) 3
2. F1 1.3x of F2; clava shorter than three preceding antennal segments together (Viggiani, 1978; Fig. 1)[India] ..... 1. *secunda* Viggiani
-. F1 0.8x of F2; clava longer than three preceeding antennal segments combined (Fig. 169)[India] ..... 2. *manipurensis* sp. nov.
3. F1 0.7x of F2, F2 and F3 subequal and slightly longer than F4 (Mathot, 1966; Fig. 9) [Democratic Republic of Congo (Zaire)] ..... 3. *camptopteroides* Mathot
-. F1 0.9x of F2, F3 longest, F2 subequal to F4[Australia] ..... 4. *vasta* (Girault)

1. ***Eofoersteria secunda*** Viggiani

Eofoersteria secunda Viggiani, 1978: 110–39, Female. India. Tamil Nadu (MHNG, not examined).

Eofoersteria secunda Viggiani: Anis & Rehmat, 2013: 3, checklist. Manickavasagam & Rameshkumar, 2013: 563, checklist.

Diagnosis

Female. Body length, 0.32 mm.

Head with interocullar area with polygonal cells and transverse sculpture; occipital area transversely striated. Antennal scape twice as long as the pedicel; F1 longest, F2 subequal to F3, F5 subequal to F6, F4 slightly longer than F5, clava shorter than F4–F6 combined or three preceding segments. Mesosoma longer than metasoma; pronotum short, hardly visible in dorsal view, mesoscutum with transverse reticulations having polygonal cells; scutellum with more prominent sculpture towards posterior part, metanotum extremely reduced; propodeum with transverse

reticulations having 4 carinae medially. Fore wing longer than body, with three rows of discal setae one row of median discal setae and two submarginal rows. Hind wing with one row of median discal setae. Legs normal, with 4-segmented tarsi. TIV longest. Metasoma with short petiole. Ovipositor slightly longer than metasoma.

Colour. Body colour brown, with gaster dark brown; antenna and legs light brown.

Male. Unknown.

Distribution. India: Tamil Nadu.

Comments. The above diagnosis is based on the original description and illustrations given by Viggiani (1978). *E. secunda* differs from to *E. camptopteroides* Mathot by having F1 about 1.3x as long as F2; clava shorter than three preceding antennal segments together and propodeum without any carinae.

2. ***Eofoersteria manipurensis*** **sp. nov.**

(Figures 169–174)

Description

Female. Body length, 0.29 mm.

Head (Fig. 172). Occipital area with transverse reticulations having polygonal cells in the middle; posterior ocellus almost touches the trabeculae and ocelli present in an obtuse angle, frontal trabeculae divided into 6 pieces. Mandibles unidentate. Antenna (Fig. 169) scape about 1.4x as long as pedicel; F1 0.83x of F2 length, F3–F6 almost equal in length but slightly increasing in width distally; clava longer than F4–F6 combined, with 4 longitudinal sensilla covering whole length of clava.

Mesosoma (Fig. 172) longer than metasoma (53:25), with transverse reticulation on mesoscutum; anterior scutellum smooth, posterior scutellum with transverse reticulations having large polygonal cells in the middle part; each axilla with a long and strong seta reaching to half of scutellum length; propodeum with 2 carinae and 4 peg like setae clearly visible in middle of the propodeal carinae. Fore wing (Fig. 170) narrow, 18.7x as long as broad; longest marginal fringe, 8.12 x as long as width of fore wing, venation with 2 macrochaeta on marginal vein, 10–11 tubercles and a row of 8 setae on middle of the wing disc and a single seta below venation, about 2x

as long as other discal setae in the middle row of the disc. Hind wing 33.7x as long as broad with a row of setae in middle of the disc. Legs (Fig. 174) 4-segmented tarsi, TIV & TV fused (genus character), as long as scape length.

Metasoma (Fig. 173) shorter than mesosoma; petiole (Fig. 173) wider than long with transverse reticulation on lateral surface of petiole; ovipositor not exserted and covers 0.62x of total gaster length. Cercal setae long almost half of gaster length. Colour. Body colour dark brown except antennal segments and legs light brown. Fore wing with slight infuscation at base, rest hyaline. Hind wing subhyaline.

Relative measurements (on slide): HW, 38; DBT, 14; POL, 14; SCL,16; SCW, 5; PL, 11; PW, 8; CLL, 29; CLW, 10; F1L, 10; F1W, 2; F2L, 12; F2W, 2; F3L, 8; F3W, 3; F4L, 8; F4W, 4; F5L, 9; F5W, 4; F6L, 9; F6W, 5; MESL, 53; MSCL, 18; SCTL, 22; Meso. PL, 17; PDL, 10; PETL, 7; PETW, 13; FWL, 150; FWW, 8; FFL, 65; HWL, 135; HWW, 4; FFm, 25; FTb, 25, FTrs, 35; FT4, 16; MFm, 27; MTb, 40; MTrs, 36; MT4, 15; HFm, 26; HTb, 40; HTrs, 40; HT4, 17; METL, 40; OVL, 25.

Male. Unknown.

Hosts. Unknown.

Material examined. *Holotype* Female (on slide under 4 coverslips), INDIA: MANIPUR: Imphal, 11.11.2011, Coll. S. Begum. (ZDAMU, registration No. HYM. CH. 712)

Distribution. India: Manipur.

Etymology. The species named after the Indian state Manipur, from where it is collected.

Comments. The species is close to *E. secunda* Viggiani (1978), it differs as follows: F1 shorter than F2 (F2 longest), clava longer than the last three funicular segments combined; propodeum without any reticulations and presence of 4 peg like setae clearly visible in the middle of the carinae; ovipositor 0.62 x of gaster length (see also key to species). (In *E. secunda*: F1 about 1.3x as long as F2; clava shorter than three preceding antennal segments together; propodeum with transverse reticulations and absence of setae; ovipositor slightly longer than gaster).

6. Genus *Erythmelus* Enock

(Figures 175–217)

Erythmelus Enock, 1909: 454. Type species *Erythmelus goochi* Enock, by monotypy.

Enaesius Enock, 1909: 456. Type species *Enaesius agilis* Enock, designated by Gahan & Fagan 1923:50. Synonymized by Debauche, 1948: 194, 197. Donev, 2004 (redefinition as a valid subgenus, diagnosis, key to species in the Balkan Peninsula).

Parallelaptera Enock, 1909: 454. Type species *Parallelaptera panis* Enock, by monotypy. Synonymized by Schauff, 1984:45.

Anthemiella Girault, 1911 [90]: 185. Type species *Anthemiella rex* Girault, by original designation. Synonymized by Schauff, 1984: 45; previous synonymized by Girault, 1912 [112]: 297.

Erythmelellus Viggiani and Jesu, 1985: 487. (as a subgenus of *Erythmelus*). Type species *Erythmelus lygivorus* Viggiani and Jesu, by original designation.

References. Triapitsyn, 2003: 33–34, review of Primorskii Kari (Russia). Triapitsyn *et al.*, 2007: 1–64, review of Nearctic species, key to subgenera of New World fauna.

Diagnosis

Female. Head (Fig. 203). Vertex usually transversely striate, narrow gena behind eyes, pre orbital and supraorbital trabeculae divided into pieces; mandibles minute, with a considerable gap between them and with only one tooth or a stub; maxillae enlarged, elongate. Funicle 5- or 6-segmented, sometimes 4-segmented; clava mostly with 5 or 6 longitudinal sensilla. Pronotum and propodeum mediolongitudinally divided, dorsellum small and triangular lobe like projecting above propodeum; tarsai 4-segmented. Fore wing usually with very few setae (Fig. 204). Fore leg with inner margin of protibial spur comblike. Petiole wider than long, hypopygium prominent, extending to apex of gaster as in fig. 207. Ovipositor with

simple to loop, not exserted, slightly exserted to much exserted beyond apex of hypopygium.

Colour. Body mostly dark brown. Midlobe of mesoscutum with a faint, slightly lighter yellow to brown transverse submedian stripe, and borders of axilla yellow to light brown. Legs light brown to brown. Hypopygium brown.

Male. Flagellum 10 or 11-segmented and genitalia with adeagous not fused with the phallobase and apodemes not articulated at its base.

Hosts. Reported mainly from Tingidae and Miridae (Triapitsyn, 2003).

Distribution. Cosmopolitan.

Species. World, 57 species (Noyes, 2015); India, 9 species (including two new species and two new records from India in present work).

Comments. The genus is distinguished from genera of the *Anaphes* group mainly distinguished by mandibles unidentate, stub like and with a gap between them; hypopygium well develop, extending to apex of gaster, ploughshare-shaped. Fore wing with very few discal seate.

Genus *Erythmelus* contains two subgenera, *Erythmelus* and *Paralleloptera*, subgenus *Erythmelus* further divided into four species group namely the *agilis* species group, the *flavovarius* species group, the *helopeltidis* species group and the *clavatus* species group, explained by Triapitsyn (2003). The *agilis* and *clavatus* are the only two species groups, whose members have not been yet recorded from India. Previously Indian species of *Erythmelus* placed into genera *Erythmelus* and *Paralleloptera* by Subba Rao (1989). Manickavasagam *et al.* (2012) also provided key to Indian species of Genus *Erythmelus.* According to the current classification of genus *Erythmelus* Enock, given by Triapitsyn, 2003, Indian species of *Erythmelus* also placed here into two subgenera and within *E. (Erythmelus),* into four species groups.

Key to Indian species of Genus *Erythmelus* (females)

1. Funicle of female antenna 5-segmented (Fig. 175), fore wing with margin almost parallel, about as wide with margins almost parallel, about as wide at apex of the marginal vein as at the broadest part of the disc (Fig. 177) .... Subgenus *Paralleloptera* Enock

   All funicle segments longer than broad; F1-F3 slightly longer or subequal to pedicel length; F3 and F4 combined length shorter than F5 (about 1.5–1.6x of F3 and F4 combined length) F5 longest funicle segment with 2 longitudinal sensilla; clava 5–5.7x longer than broad with 5 longitudinal sensilla (Fig. 176)] ..... 1. *E. (P.) panis*

-. Funicle of female antenna 6-segmented (Fig. 185); fore wing with margins not parallel, usually much wider at the broadest part of the disc than at apex of the marginal vein (Fig. 186) ..... Subgenus *Erythmelus* Enock 2

2. Ovipositor relatively short, without a large basal loop (Fig. 188) (*flavovarius* species group) 3

-. Ovipositor relatively long with a large basal loop (Fig. 207) (*helopeltidis* species group) 6

3. F5 without longitudinal sensillum (Fig. 185) 4

-. F5 with one longitudinal sensillum and much shorter than F6 (Fig. 181) ..... 2. *E. (E.) rosascostai* Ogloblin

4. Mid lobe of mesoscutum with anterior half or so brown and posterior half or so contrastingly yellow or light brown (Fig. 188) ..... 3. *E. (E.) flavovarius* (Walker)

-. Mid lobe of mesoscutum mostly brown to dark brown except for a pale, or yellow, or light brown transverse submedian stripe, or sometime uniformly brown (Fig. 193) 5

5. Ovipositor length: hind tibia length ratio at least 2.0:1 (Fig. 194) .... 4. *E. (E.) miridiphagous* Dozier

-. Ovipositor length: hind tibia length ratio at least 1.3:1 (Fig. 197) .... 5. *E. (E.) jawanensis* sp. nov.

6. Fore wing disc more uniformaly setose at apex (Fig. 200); first gastral tergum contrastingly brown basally and yellow or light brown distally (Fig. 202) 7

-. Fore wing disc less uniformaly, more sparsely (Fig. 204), setose at apex; first gastral tergum entirely white or pale (Fig. 207) 8

7. Scape 4.6x as long as broad, clava about 3.3x as long as wide (Fig. 199); Fore wing 5.5x as long as broad (Fig. 200). Ovipositor (forming short loop), slightly exserted beyond the apex of hypopygium (Fig. 202), Ovipositor length: hind tibia length ratio at least 1.5 ..... 6. *E. (E.) shillongus* sp. nov.

-. Scape 2.8x as long as broad, clava about 3.3x as long as wide (Fig. 203); Fore wing 4.2x as long as broad (Fig. 204). Ovipositor markedly exserted beyond the apex of hypopygium, Ovipositor length (Fig. 207): hind tibia length ratio at least 2.08–2.2 ..... 7. *E. (E.) lygivorous* Viggiani & Jesu

8. Mid and hind tibia apices of females, dark brown (Fig. 209) .....

..... 8. *E. (E.) nuinu* Triapitsyn

-. Mid and hind tibia totally light brown (Fig. 218) ..... 9. *E. (E.) helopeltidis* Gahan

1. Subgenus *Paralleloptera* Enock

(Figures 175–179)

Parallelaptera panis Enock, 1909: 454. Type species *Paralleloptera panis* Enock, by, monotypy. Peck, 1963: 31, catalogue. De Santis, 1979:369, catalogue.

Anthemiella Girault 1911b: 187. Type species *Anthemiella rex* Girault, by original designation. Synonymized by Girault, 1912: 297.

Erythmelus Enock: Schauff, 1984: 45 (in part). Trjapitzin, 1993: 267 (as the *panis* species group).

Erythmelus Enock (subgenus *Parallelaptera* Enock): Triapitsyn, 2003: 33–34, diagnosis, revision of world species. Donev, 2004: 125, diagnosis.

Erythmelus Enock (subgenus *Parallelaptera* Enock): Triapitsyn, 2007: 8–10, diagnosis and review of Nearctic species.

Diagnosis

Female. Body length, 0.41–0.5 mm. Antenna with 5-segmented funicle, F5 longest, clava with 5 longitudinal sensilla. Fore wing narrow and broadest apically, anterior and posterior margins almost parallel beyond venation; disc without a seta behind base of marginal vein; petiole much wider than long.

Colour. Body brown to dark brown except lateral part of axilla, scutellum and petiole white to yellowish. Fore wing slightly infuscated.

Male. Similar to female except antenna with 10-segmented funicle and genitalia simple.

Host. Tingidae (Hemiptera). (Livingstone *et al.*, 1997).

Distribution: Cosmopolitan.

Species. World, 4 species (Triapitsyn *et al.*, 2007); India, only one species.

Comments. Previously India has two species described from this subgenus. Later *Erythmelus (Paralleloptera) panchamae* Hayat, 1992 synonymized by Triapitsyn, 2003 under *Erythmelus (Paralleloptera) panis* Enock on the basis of similarities of characters of both species. *Erythmelus (Paralleloptera) teleonemiae* (Subba Rao, 1984), synonymized in the present work, as all the antennal characters of this species comes within the range of *E. (P.) panis* Enock characters.

1. ***Erythmelus (Parallelaptera) panis*** Enock

(Figures 175–179)

Parallelaptera panis Enock, 1909: 454.

Parallelaptera foucarti Mathot in Demaire, 1973: 30. Synonymized by Triapitsyn, 2003.

Paralleloptera teleonemiae Subba Rao, 1984: 253 (Holotype Male, Female, Banglore, Karnataka, India [BMNH], not examined) **syn.nov.**

Parallelaptera polyphaga Livingstone & Yacob, 1988; 396-398. Synonymized by Hayat, 1992.

Parallelaptera panchama Subba Rao, 1989: 165. Synonymized by Triapitsyn, 2003.

Erythmelus panchamae [Sic]: Hayat, 1992: 88.

Erythmelus panchamus: Trjapitzin, 1993: 268, 270.

Parallelaptera panis Enock, 1909: Manickavasagam *et al.*, 2011: 395, distributional records, key. Anis & Rehmat, 2013: 3, checklist. Manickavasagam & Rameshkumar, 2013: 563, checklist.

Diagnosis

Female. Body length, 0.41–0.5 mm. Head with vertex brown, face pale; antenna pale except scape and pedicel brown. Ovipositor and dorsal part of scape dark brown. Antenna (Fig. 175) with 5-segmented funicle; pedicel with longitudinal striation and scape about 2–2.5x as long as pedicel and 4.1–4.6x longer than wide. All funicle segments longer than broad; F1–F3 slightly longer or subequal to pedicel length; F3 and F4 combined length shorter than F5 (about 1.5–1.6x of F3 and F4 combined length) F5 longest funicle segment with 2 longitudinal sensilla; clava 5–5.7x longer than broad (40:7) with 5 longitudinal sensilla. Mesosoma (Fig. 179) longer than metasoma about 0.7–1.1x as long as metasoma length; mesoscutum length exactly equal to scutellum length. Fore wing (Fig. 177) about 5.5–7x longer than broad and longest marginal fringe about 3–3.6x of maximum width of fore wing.

Hind wing (damaged) Tarsi 4-segmented. Metasoma (Fig. 179) with ovipositor about 1.5–1.6x as long as hind tibia length and reaching to the apex of the hypopygium, slightly to not exserted. In specimen from Sikkim, exserted ovipositor 0.15x of its total length.

Colour. Body dark brown except lateral part of axilla, scutellum and petiole white. Fore wing slightly infuscated.

Relative measurements (slide from Orissa). DBT, 12; POL, 20; SCL, 28; SCW, 6; PL, 14; PW, 8; CLL, 40; CLW, 7; F1L, 4; F1W, 3; F2L, 5; F2W, 4; F3L, 5; F3W, 3; F4L, 8; F4W, 4; F5L, 20; F5W, 6; MESL, 83; MSTL, 30; SCTL, 30; PDL, 18; FWL, 140; FWW, 20; FFL, 73; FFm, 48; FTb, 44, FTrs, 48; MFm, 36; MTb, 50; MTrs, 50; HTb, 42; HTrs, 55; METL, 75; OVL, 63.

Relative measurements (slide from Sikkim). SCL, 25; SCW, 6; PL, 10; PW, 6.5; CLL, 35; CLW, 7; F1L, 2; F1W, 2; F2L, 5; F2W, 2; F3L, 5; F3W, 2.5; F4L, 8.5; F4W, 3.5; F5L, 22; F5W, 4; MESL, 88; FWL, 110; FWW, 20; FFL, 60; MFm, 30; MTb, 45; MTrs, 50; HFm, 35; HTb, 40; HTrs, 45; METL, 70; OVL, 65; Ext.OVL, 10.

Male. Antenna 10-segmented, F2 much shorter than F1 and F3.

Material examined: INDIA: ORISSA [=ODISHA]; Khorda, Kadurai, 1 Female (on slide) 3.xii.2007, Coll. F.R. Khan; Bhubanshwar, Benipur, 1 Female (on slide),

26.xi.2007, Coll. F.R. Khan; SIKKIM: Gangtok, Daragaon, 1Female (on slide), 2. vi. 2008, Coll. F.R. Khan.

Host. Tingidae (Hemiptera), listed by Livingstone *et al.* (1997); Maral *et al.* (2014). Elsewhere reported from *Corythucha ciliate* (Say, 1832) (Viggiani & Jesu, 1988) and *Stephanitis pyri* (Fabricius; 1775) (Goncharenko & Fursov, 1988); (Akbarzadeh-Shoukat, 1998); (Triapitsyn, 2003) (Tingidae). The lacebugs *Habrochila ghesquierie* (Schouteden, 1953) and *Tingis ampliata* (Herrich-Schaeffer, 1838) are additional host records for *E. panis.*

Distribution: India: Kerala, Karnataka (by synonymy of *E. teleonemiae*), Orissa [=Odisha] **(present record)**, Pudhucherry, Sikkim **(present record)**, Tamil Nadu (Subba Rao, 1989). (China, Austria, Belgium, Bulgaria, Cape Verde Islands, Democratic Republic of the Congo, Denmark, Finland, France, Germany, Greece, hungary, India, Iran, Iraq, Italy, Kyrgyzstan, Mali, Moldova, Norway, Russia, Rwanda, Spain, Switzerland, Turkey, UK, Serbia and Kenya)

Comments: This species is new record from the Indian states of Orissa [=Odisha] and Sikkim. It is common and worldwide species. Females of Indian species of *E.* (*Parallelaptera*) *panis* shows a wide variation in fore wing and funicle segments length/width ratio. Based on morphological characters given in the descriptions of Subba Rao, 1984 and materials examined (present work), *Erythmelus teleonemaie* Subba Rao fall within the range of characteristic features of *Erythmelus* (*Paralellaptera*) *panis*, and therefore *Erythmelus teleonemaie* Subba Rao synonymized herein under *Erythmelus (P.) panis.*

2. Subgenus *Erythmelus* Enock

(Figures 180–219)

Erythmelus Enock, 1909: 454. Type species *Erythmelus goochi* Enock, by monotypy.

Enaesius Enock, 1909: 456. Type species *Enaesius agilis* Enock, designated by Gahan & Fagan 1923:50. Synonymized by Debauche (1948: 194, 197). Donev, 2004 (redefinition as a valid subgenus, diagnosis, key to species in the Balkan Peninsula).

Erythmelellus Viggiani & Jesu, 1985: 487. (as a subgenus of *Erythmelus*). Type species *Erythmelus lygivorus* Viggiani & Jesu, by original designation. Synonymized by Triapitsyn, 2003: 5.

Erythmelus (Erythmelus) Enock: Triapitsyn, 2003: 5–33, diagnosis, definition of the species groups, revision of Palaearctic species. Donev, 2004: 120–122, key to species groups, diagnosis of the species groups, key to species in the Balkan Peninsula.

Erythmelus (Erythmelus) Enock: Triapitsyn *et al.*, 2007: 6–10, key to subgenera and species, review of Nearctic species.

Diagnosis

This subgenus of *Erythmelus*, characterized by a relatively short antenna (Figs.185 & 195), female funicle usually 6–segmented but sometimes 5-segmented (mainly in very small individuals or, more frequently, in minute species that parasitize eggs of Tingidae), due to a fusion of any two neighboring funicular segments or a loss of one of the funicular segments, usually of F3 or F4, or, very rarely, 4-segmented, due to an apparent loss of F3 and a complete or partial fusion of F1 and F2; F6 usually longest with remaining funicle segments of various length; clava with 5 or 6 (very rarely with 7) longitudinal sensilla; male flagellum usually 11–segmented, rarely 9 or 10-segmented, with all flagellomeres more or less subequal in length; forewing mostly with margins not parallel, usually much wider at broadest part of blade than at apex of marginal vein, disc with a seta behind base of marginal vein; petiole wider than long; forewing discal setation often leaving a large bare area in the apical half (Fig. 200). Ovipositor simple without a basal loop except in *E. miridiphagus* (with a basal loop as in fig. 194). The male genitalia relatively simple or more complex. with sclerotized processes on the parameres (some Palearctic and Nearctic species are without sclerotized processes on the parameres).

Host. Cicadellidae, Diaspididae, Miridae, Tingidae (Hemiptera).

Distribution: Cosmopolitan.

Species. World, 55, species; India, 8 species (Including two new species and two new records in present work).

Comments. Most of the world species of the genus *Erythmelus* comes under this subgenus. Currently only one species is known from India. *Erythmelus empoascae,* described and illustrated by Subba Rao (1966, 1970) from India, later studied by Triapitsyn (2003) considered conspecific with *Erythmelus (E.) flavovarius* and then further synonymized by Triapitsyn (2007).

3. *Erythmelus (Erythmelus) rosascostai* Ogloblin

(Figures 180–184)

Erythmelus (E.) rosascostai Ogloblin, 1934: 249–250, Female, Argentina (MLP, not examined).

Erythmelus (E.) rosascostai Ogloblin: Triapitsyn *et al.*, 2007: 19, redescription, illustrations.

Redescription

Female. Body length, 0.53 mm.

Head (Fig. 180). Vertex transversely striate with few setae. Antennal scape (Fig. 181) 6.8x as long as broad with long setae; pedicel much longer than F1; all funicle segments longer than wide; F1 the shortest funicle segment, F2–F5 almost subequal in length and shorter than F6; F1–F5 without longitudinal sensillum, F6 with two longitudinal sensilla; clava 3.9x as long as wide, with 5 longitudinal sensilla.

Mesosoma (Fig. 184) with each lobe of pronotum with 3 setae. Mesoscutum much wider than long, its midlobe finely longitudinally striate with 1 pair of setae; axilla with 1 seta each. Scutellum shorter than mesoscutum (36:42), posterior scutellum with fine longitudinal striations. Dorsellum angulate posteriorly. Fore wing (Fig. 182) narrow, 5.14x as long as broad, disc hyaline except below venation slightly infuscate, more or less uniformly setose in more than half of the disc; longest marginal fringe about 0.9x as long as wing width. Hind wing 18x a (Fig. 183) s long as broad; blade hyaline.

Metasoma (Fig. 184). Longer than mesosoma; ovipositor 1.5x of gaster length and reaching to the apex of hypopygium (not exserted); ovipositor and mid tibia ratio is 1.1.

Colour. Body mostly dark brown except base of gaster yellow and hypopygium light brown, dorsellum and borders of axilla and scutellum yellow; mid lobe of mesoscutum with a light brown, transverse, submedian stripes (the stripe much wider laterally than medially). Pedicel and funicle segments light brown; scape and apex of clava dark brown.Gastral tergite brown at apex rest yellowish.

Relative measurements (slide): DBT, 16; POL 25; SCL, 48; SCW, 7; PL, 18; PW, 7; CLL, 47; CLW, 12; F1L, 8; F1W, 5; F2L, 9; F2W, 5; F3L, 9; F3W, 5; F4L, 10; F4W, 5; F5L, 11; F5W, 6; F6L, 15; F6W, 6; MESL, 105; MSTL, 42; SCTL, 36; PDL, 19; FWL, 180; FWW, 35; FFL, 33; HWL 180; HWW 10; FFm, 51; FTb, 50, FTrs, 65; MFm, 41; MTb, 65; MTrs, 70; HFm, 50; HTb, 65; HTrs, 70; METL, 112; OVL, 73.

Male. Similar to female except for the normal sexually dimorphic features such as antenna genitalia. Flagellum 11-segmented, all segments a little longer than scape. Fore wings about 5x as long as wide; longest marginal cilia about 1.9x greatest fore wing width. Gaster shorter than mesosoma.

Material examined: INDIA: UTTAR PRADESH: Bahraich, Mulla Purwa, 1 Female (on slide), 30.ix.2006, Coll. S.M.A. Badruddin & F.R. Khan.

Hosts. Unknown.

Distribution. India **(present record)**: Uttar Pradesh (Argentina).

Comments. It is new record from India. This species is the member of *flavovarius* species group. *Erythmelus (E.) rosascostai* is distinguished from other species of *Erythmelus (E.)* on the basis of its very narrow fore wings with more than half part of disc uniformly setose. The specimens listed above agree fairly well with the original description and figures given for *Erythmelus (E.) rosascostai* by Ogloblin (1934) and redescription by Triapitsyn *et al.*, (2007). In the above specimen F6 with two longitudinal sensilla on both antenna.

4. *Erythmelus (Erythmelus) flavovarius* (Walker)

(Figures 185–188)

Panthus flavovarius Walker, 1846:52 (lectotype Female, designated by Graham 1982:219 [Hope Entomological Collections, Oxford, England, UK,]: Graham 1982: 219-220.

Erythmelus flavovarius (Walker): Graham 1982: 219-220.

Erythmelus (Erythmelus) flavovarius (Walker): Triapitsyn, 2003: 17-21, taxonomic history, diagnosis, distribution, host associations. Donev, 2004: 122-123, diagnosis, distribution.

Erythmelus goochi Enock, 1909: 455, plate XIII (lectotype Female, designated by Graham 1982: 220 [Natural History Museum, London, England, UK], examined. Holloway, London, England, UK). Synonymized by Triapitsyn, 2003:17.

Enaesius parvus Soyka, 1932: 83 (? Holotype Female [? lost from Naturhistories Museum Wien, Vienna, Austria], not examined. Valkenburg, Limburg, Netherlands). Synonymized by Graham, 1982: 219.

Erythmelus maculates Enock: Kryger, 1950: 61 (nomen nudum).

Erythmelus (Enaesius) dichromocnemus Novicky, 1953: 13 (? Holotype Female [present depository unknown], not examined (An unspecified locality in Poland). Synonymized by Triapitsyn, 2003: 17.

Erythmelus empoascae Subba Rao, 1966: 192, 194, Holotype, Female [lost from the Indian Agriculture Research Institute, New Delhi, India], not examined. Type locality: [? New] Delhi, India. Synonymized by Triapitsyn *et al.*, 2007.

Erythmelus (Erythmelus) empoascae Subba Rao: Triapitsyn, 2003: 15, mentioned as member of the *flavovarius* species group.

Erythmelus spinosus Mathot, 1969: 15 (Holotype Female [Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium], not examined. Riezes, Hainaut, Belgium). Synonymized by Triapitsyn, 2003: 17.

Erythmelus miridiphagus Dozier: Sohati *et al.,* 1989: 1127 (misidentification). Sohati *et al.,* 1992: 515–521, misidentification.

Erythmelus sp. 2: Beardsley & Huber, 2000: 15, short diagnosis, distribution in the Hawaiian Islands.

Erythmelus flavovarius: Triapitsyn *et al.,* 2007: 47–49, short Diagnosis, taxonomic history, distribution, host associations. Huber *et al.*, 2009: 271, list; Pricop, 2009: 125, list; Manickavasagam *et al.*, 2011: 395, key, 397, distribution, 402, illustrations, 407, distribution. Anis & Rehmat, 2013: 4, checklist. Manickavasagam & Rameshkumar, 2013: 564, checklist.

Diagnosis

Female. Body length, 0.5 mm. Antenna (Fig. 186) with all funicule segments longer than wide, F4 usually without longitudinal sensillum, F6 usually with 2 longitudinal sensilla, clava with 5 longitudinal sensilla. Fore wing (Fig. 186) 4.4–4.9 or 5.5x (present work) as long as broad, with apical part of disc (almost 1/3) more or less evenly setose, and remainder of disc with few setae, longest marginal fringe 1.4–1.7x of wing width. Hind wing (Fig. 187) 16–18x as long as broad. Ovipositor (Fig. 188) 7/10–4/5 length of gaster, exserted beyond apex of gastral tergum, ratio of ovipositor and length of hind tibia is 1.5–1.6:1.

Colour. Body brown except midlobe of mesoscutum, which is partly brown (the anterior half more or less) and partly yellow or light brown (the posterior half); yellow patches are present on the lateral lobes of mesoscutum, axilla and the mesopleura, and almost 1/3 of the base of the gaster is yellow to light brown.

Relative measurements (slide): DBT, 22; EH, 45; SCL, 40; SCW, 7; PL, 15; PW, 8; CLL, 45; CLW, 11; F1L, 5; F1W, 4; F2L, 7; F2W, 4.5; F3L, 6; F3W, 5; F4L, 6; F4W, 5; F5L, 8; F5W, 6; F6L, 12; F6W, 7; MESL, 105; MSCL, 37; SCTL, 36; PDL, 18; FWL, 100; FWW, 30; FFL, 36; HWL, 250; HWW, 8; HFL, 42; FFm, 45; FTb, 40, FTrs, 57; MFm, 40; MTb, 55; MTrs, 57; HFm, 42; HTb, 55; HTrs 62; METL, 100; PETL, 17; OVL, 82; Ext.OVL, 8.

Male. Similar to female except for the sexual dimorphic characters; antenna with all finicle segments almost equal to scape, forewing slightly wider than in female (4.0–4.4x as long as broad), and genitalia about 3/5–7/10 length of gaster.

Material examined: INDIA: UTTAR PRADESH, Mathura, Barari, 2 Females (on slides), 29.viii.2007, Coll. F.R. Khan; Mainpuri, Malau, 1 Female (on slide), 6.ix.2007, Coll. F.R. Khan; Firozabad, Nagla prabhu; 1Female (on slide), 4.ix.2007, Coll. F.R. Khan; Agra, Tundla, Jadon Garhi, 1Female (on slide), 4.iv.2011, Coll. F.R.Khan; WEST BENGAL, New Jalpaiguri, Chhat Purdanpura, 1Female (on slide), 30.v. 2008, Coll. F.R. Khan; Siliguri, Bagdogra, 1Female (on slide), 28.v.2008, Coll. F.R.Khan; Darjeeling, Gorabari, 1Female (on slide), 15.vi.2008, Coll. F.R. Khan; Islampur, Sibdargi Para, 1Female (on slide), 10.vi.2008, Coll. F.R. Khan; Islampur, Tinpool, 1Female (on slide), 6.vi.2008, Coll. F.R. Khan.

Additional material examined (on slides): INDIA: UTTAR PRADESH, Aligarh, 1 Male, 27.xii.1984, Coll. M. Hayat; Aligarh, 2 Females, 26.xi.1983, Coll. M. Hayat; Aligarh, 1Female, 18.x.1985, Coll. M. Hayat; Aligarh, 1 Female, 18.x.1995, Coll. M. Hayat; Aligarh, 1Female, April 1985, Coll. M. Hayat; Aligarh, 1Female, November 1982, M. Hayat; Aligarh, 1Female, 12.x.1986: Coll. M. Hayat; Aligarh, 1 Female, 31.x.1977, Coll. M. Hayat & M. Verma (determined by M. Hayat as *E. empoascae*).

Host. Unknown from India, elsewhere reported from Miridae & Lygaeidae (Triapitsyn *et al.*, 2007).

Distribution. India: Delhi, Karnataka, Kerala, Puducherry, Tamil Nadu, Uttarakhand, Uttar Pradesh, West Bengal **(Present record)**.

Comments. It is new record from Indian state of West Bengal. This species represent the *flavovarius* species group. It is new record from Indian state of West Bengal. The lectotype of *E. flavovarius* is in the HDOU (UK) and could not be examined. Therefore, the above specimen is compared with the description and figures given by Triapitsyn, 2003 and Triapitsyn *et al.*, 2007) and found to be conspecific with *E. flavovarius.*

5. *Erythmelus (Erythmelus) miridiphagus* Dozier

(Figures 189–194)

Erythmelus miridiphagus Dozier, 1937: 133–134, Female, (USNM, not examined).

Erythmelus (*Erythmelus*) *miridiphagus* Dozier: Triapitsyn, 2003: 15 (mentioned as member of the *flavovarius* species group).

Redescription

Female. Body length, 0.9 mm.

Head (Fig. 189). Vertex transversely striate, with a few short setae. Antenna. (Fig. 190) with short setae. Scape 5.8x as long as wide; pedicel much longer than wide. F1 the shortest funicular segment, F3 at least a little longer than F2, F4–F5 subequal in length and much shorter than F6; F6 longest in length, with 2 longitudinal sensilla; clava 3.2x as long as wide, with 5 longitudinal sensilla.

Mesosoma (Fig. 191) smaller than metasoma, mesoscutum almost equal to scutellum, with its mid lobe finely longitudinally striate and with 1 pair of strong setae; axillar seta extending to length of scutellum longitudinally striate. Fore wing (Fig. 191). 4.3–5.0x as long as broad; disc slightly infuscate behind venation but otherwise hyaline, with setae mostly along margins in the distal part; longest marginal cilia 1.5x as long as wing width. Hind wing (Fig. 192) 18x as long as broad, a little shorter than forewing; disc slightly infuscate apically; longest marginal cilia 4.3x as wing width.

Metasoma (Fig. 194) longer than mesosoma; petiole wider than long; ovipositor about 1.09x of gaster length, markedly exserted beyond apex of hypopygium (0.17x of ovipositor length) and 2.10x of hind tibia length.

Colour. Body mostly dark brown, hypopygium brown; midlobe of mesoscutum with a faint, slightly lighter (brown) transverse submedian stripe, and borders of axilla light brown. Legs light brown to brown.

Relative measurements (slide): SCL, 70; SCW, 12; PL, 23; PW, 12; CLL, 68; CLW, 21; F1L, 9; F1W, 6; F2L, 7; F2W, 7; F3L, 7; F3W, 8; F4L, 14; F4W, 8; F5L, 14; F5W, 10; F6L, 26; F6W, 12; MESL, 155; MSCL, 55; SCTL, 54; PDL, 20; FWL, 235; FWW, 50; FFL, 75; HWL 235; HWW 13; HFL 56; FFm, 20; FTb, 73, FTrs, 90; FFm, 70; MTb, 98; MTrs, 100; MFm, 75; HTb, 95; HTrs 110; METL, 182; PETL, 17; OVL, 200; Ext.OVL, 35.

Male. Similar to female except the normal sexually dimorphic features. Flegellum 11-segmented, all segments a little longer than scape. Fore wing 4.3–4.5x as long as wide, with wing disc more setose in the apical half then in female; longest marginal fringe 1.5–1.9x greatest forewing width. Metasoma shorter than mesosoma. Genitalia typical for the *helopeltidis* species group exception of *flavovarius* species group.

Material examined: INDIA: UTTAR PRADESH, Firozabad, Nagla Prabhu, 1 Female (on slide), 4.ix.2007, Coll. F.R. Khan; Aligarh, Jawan, 1 Female (on slide), 12.vii.2011, Coll. S. B. Anis & T. Rehmat.

Hosts: Unknown from India. Elsewhere reported on *Polymerus cuneatus* (Distant) (Miridae) (Dozier 1937). *Lygus* sp. (miridae) indicated by A. A. Ogloblin from Loreto, Misiones, Argentina.

Distribution: India **(present record)**: Uttar Pradesh. (Argentina, Mexico, Puerto Rico, Venezuela, U.S.A.)

Comments: It is new record from India. The specimens listed above agree fairly well with the original description and figures given for *Erythmelus (E.) miridiphagus* by Dozier (1937) and seems conspecific with *Erythmelus (E.) miridiphagus.* It differs from other Indian species by the characters given in the key.

6. *Erythmelus (Erythmelus) jawanensis* sp. nov.

(Figures 195–198)

Description

Female. Body length, 0.53 mm.

Head (Fig. 195) with transverse striation on occipital region. Scape and pedicel with longitudinal striations; scape 4.8x as long as wide. All finical segments longer than wide except F2 almost quadrate, F1 smallest and F6 longest segments, F4 about 1.3x as long as F5 (longer than F5), F6 almost 2x the length of F5 about 2.1x as F5. F4 with one longitudinal sensillum and F6 with 2 longitudinal sensilla; clava 4.7x as long as wide with 5 sensilla (Fig. 195). F1 to F3 and F5 without longitudinal sensillum.

Mesosoma (Fig. 198). Mesoscutum longer than broad, mid lobe with fine longitudinal striations, with 1 pair of strong setae. Scutellum about as long as mesoscutum (34:38), posterior scutellum with fine longitudinal striations, dorsellum narrow and angulate posteriorly. Fore wing (Fig. 196) narrow, 4.4x as long as wide; disc slightly infuscate behind venation, rest hyaline, densely setose in distal half or more; longest marginal fringe 1.5x of wing width. Hind wing (damaged); disc hyaline; longest marginal fringe 4.2x as long as wing width.

Metasoma (Fig. 197) as long as mesosoma; petiole wider than long; ovipositor 1.2x as long as gaster and 1.3x as long as hind tibia. Ovipositor barely exserted beyond apical tergum and not exserted beyond apex of hypopygium.

Colour. Body dark brown except base of gaster yellow to light brown; mid lobe of mesoscutum with a light brown transverse submedian stripe; borders of axilla light brown. Antennal segments light brown except apical part of clava dark brown. Legs light brown.

Relative measurements (slide). DBT, 15; SCL, 39; SCW, 8; PL, 15; PW, 8; CLL, 62; CLW, 13; F1L, 6; F1W, 5; F2L, 6; F2W, 6; F3L, 7; F3W, 7; F4L, 11; F4W, 8; F5L, 8; F5W, 7; F6L, 17; F6W, 8; MESL, 100; MSCL, 38; SCTL, 34; FWL, 170; FWW, 38; FFL, 58; HWW, 10; HFL, 42; FFm, 50; FTb, 48, FTrs, 60; MFm, 43; MTb, 62; MTrs, 63; HFm, 60; HTb, 60; HTrs 65; METL, 102; OVL, 85.

Male. Unknown.

Material examined. *Holotype* Female (on slide under 3 coverslips): INDIA: UTTAR PRADESH, Aligarh; Jawan, 17.vii.2011, Coll. S. B. Anis & T. Rehmat.

Hosts. Unknown.

Distribution. India: Uttar Pradesh.

Etymology. The species is named after the locality from where tha holotype is collected.

Comments. This species is the member of *flavovarius* species group and close to *E (E.) psallidis* Gahan by the measurements of antennal segments, F1–F3 and F5 without longitudinal sensillum, F6 with 2 sensilla, clava with 5 longitudinal sensilla, fore wing narrow about 4.4x as long as wide; petiole wider than long, gaster as long as mesosoma; ovipositor about 1.3x of hind tibia length and barely exserted beyond hypopygium but differ by F4 with a sensillum on both (Left and Right) antenna, scape 4.8x long as wide, clava about 4.7 as long as wide; ovipositor about 1.2x as long as gaster length. [In *Erythmelus (E.) psallidis:* F4 without (on the left antenna), or with one longitudinal sensillum, scape about 5.4x as long as broad, clava about 3.6x as long as wide and ovipositor about 0.7x of gaster length].

7. *Erythmelus (Erythmelus) shillongus* sp. nov.

(Figures 199–202)

Description

Female. Body length, 0.66 mm.

Head with vertex transversely striate, with a few short setae (Fig. 199). Antenna (Fig. 199) with short setae. Scape 3.7x as long as broad, pedicel with longitudinal striations, much longer than F1; all funicle segments a little longer than wide; F1 the shortest segment, F2–F5 gradually increasing in length and each much shorter than F6; F2 equal to F3 in length; F1–F5 without longitudinal sensillum, F6 with 2 longitudinal sensilla; clava 3.3x as long as broad, with 5 longitudinal sensilla.

Mesosoma (Fig. 201). Mesoscutum wider than long, its midlobe with fine longitudinal striations and 1 pair of strong setae. Scutellum exactly equal to mesoscutum, posterior scutellum finely longitudinally striate. Dorsellum broadly angulate posteriorly.

Fore wing (Fig. 200) 5.5x as long as wide; disc slightly infuscate behind venation but otherwise hyaline, with a few setae only in apical one fourth; longest marginal fringe about 2x of wing width, setation on disc only present on apex and a row around lower margins. Hind wing (damaged).

Metasoma (Fig. 202) longer than mesosoma; petiole wider than long; ovipositor (forming short loop) subequal to length of gaster, slightly exserted beyond the apex of hypopygium, 1.5x length of hind tibia.

Colour. Body dark brown except base of gaster yellow, midlobe of mesoscutum with a light brown transverse, submedian stripe, and borders of axilla and dorsellum light brown. Legs brown. Hypopygium brown.

Relative measurements (slide): DBT, 25; EH, 47; SCL, 34; SCW, 9; PL, 20; PW, 10; CLL, 50; CLW, 15; F1L, 6; F1W, 5; F2L, 8; F2W, 5; F3L, 8; F3W, 6; F4L, 9; F4W, 7; F5L, 10; F5W, 7; F6L, 20; F6W, 8; MESL, 100; MSCL, 40; SCTL, 40; PDL, 15; FWL, 200; FWW, 36; FFL, 74; FFm, 55; FTb, 50, FTrs, 70; MFm, 50; MTb, 70; MTrs, 75; HFm, 50; HTb, 70; HTrs 75; METL, 120; PETL, 15; OVL, 110; Ext.OVL, 5.

Male. Unknown.

Material examined. *Holotype* Female (on slide under 2 coverslips) INDIA: MEGHALAYA, Shillong, Ladmawphlong, 23.x.2008, Coll. F.R. Khan.

Paratype Female (on slide) INDIA: MEGHALAYA, R.Bhoi, Lumdaithla, 25.x.2008, Coll. F.R. Khan.

Hosts. Unknown.

Distribution. India: Meghalaya.

Etymology. The species is named after the locality from where tha holotype is collected.

Comments. This species seems member of *helopeltidis* species group and appears related with *Erythmelus (E.) lygivorous* by scape 3.7x as long as broad, F1 the shortest segment, F2–F5 gradually increasing in length and each much shorter than F6; F2 equal to F3 in length; F1–F5 without longitudinal sensillum; scutellum exactly equal to mesoscutum but differ on the basis of following characters: scape 4.6x as long as broad, clava about 3.3x as long as broad. Fore wing 5.5x as long as broad, setation on disc only present on apex and a row around lower margins. Ovipositor (forming short loop) subequal to length of gaster, slightly exserted beyond the apex of hypopygium, 1.5x of hind tibia length.

8. *Erythmelus* (*Erythmelus*) *lygivorus* Viggiani & Jesu

(Figures 203–207)

Erythmelus (*Erythmellus*) *lygivorus* Viggiani & Jesu, 1985: 487–490, Female, Papiano, Perugia, Italy (DEZP, not examined).

Erythmelus (Erythmelus) lygivorus Viggiani & Jesu. Triapitsyn, 2003: 29–30, diagnosis, distribution, host associations, illustrations; Donev, 2004: 121, diagnosis, distribution. Manickavasagam *et al.*, 2011: 395, distributional records, key. Anis & Rehmat, 2013: 4, checklist. Manickavasagam & Rameshkumar, 2013: 564, checklist.

Diagnosis

Female. Body length, 0.9 mm. Head (Fig. 203) rounded and higher than broad (anterior). Vertex with transverse striations; face and gena with faint sculpture. Antenna (Fig. 203) 6-segmented funicle; scape and pedicel with faint longitudinal striations and scape 2.8x as long as pedicel and 4.6x longer than wide. All funicle segments longer than broad; F1–F5 without longitudinal sensillum; F1–F3 sub equal in length; F4 and F5 equal in length; F6 longest with 2 longitudinal sensilla; clava

3.09x longer than broad, with 5 longitudinal sensilla (3 subapical and 2 medial). Mesosoma (Fig. 206) little longer than metasoma about 1.09x as long as metasoma length; mesoscutum with fine longitudinal striation on mid lobe and cellulate-reticulations on side lobes; a pair of axillar setae long and strong, reaching almost half length of scutellum. Scutellum subequal to mesoscutum, finely longitudinal striate except towards anterior margin. Metanotum with a weak seta towards each lateral part. Propodeum short and smooth. Fore wing (Fig. 204) 4.1–4.2x as long as broad and longest marginal fringe 1.2–1.3x of wing width. Fore wing disc uniformly setose at apex. Hind wing (Fig. 205) 17.3–18x as long as wide. Tarsi 4-segmented. Metasoma (Fig. 207) Ovipositor occupying almost entire length of gaster, strongly to markedly exserted beyond apex of gaster (mostly about 1/3 of its own length, degree of protrusion varies); ovipositor and hind tibia ratio is 2.2–2.08.

Colour. Body dark brown except base of gaster brown or yellow (base of T1, brown and apex of T2, yellow to light brown), Antenna light brown except clava dark brown Mid lobe of mesoscutum with a narrow light brown transverse submedian band, corners of axilla light brown. Fore wing disc slightly infuscated basally and distally, rest hyaline. Hind wing hyaline except apex, slightly infuscated. Legs light brown. Hypopygium brown.

Relative measurements (slide): DBT, 26; EH, 73; SCL, 55; SCW, 14; PL, 23; PW, 13; CLL, 68; CLW, 22; F1L, 12; F1W, 6; F2L, 13; F2W, 8; F3L, 13; F3W, 9; F4L, 15; F4W, 10; F5L, 14; F5W, 10; F6L, 23; F6W, 13; MESL, 188; MSCL, 55; SCTL, 55; PDL, 18; PETL, 22; FWL, 250; FWW, 60; FFL, 50; HWL, 260; HWW, 15; HFL, 50; FFm, 80; FTb, 75, FTrs, 7; MFm, 80; MTb, 100; MTrs, 100; METL, 172; OVL, 208; Ext.OVL, 70.

Male. Similar to female except normal sexually dimorphic characters and fore wing. Antenna 13-segmented. Fore wing comparatively wider than female, disc much more pubescent at apex.

Material examined: INDIA: UTTAR PRADESH, Etah, Sakit; 1 Female (on slide), 8.ix.2007, Coll. F.R. Khan.

Host. Unknown. Elsewhere reported from *Lygus* sp., *Lygus paratensis* Linnaeus, 1758, *Lygus rugulipennis* Poppius, 1911 (Hemiptera: Miridae) [Viggiani & Jesu, 1985].

Distribution: India: Kerala, Uttar Pradesh **(present record).** (China, Bulgaria, France, Hungary, Italy, Spain, Romania)

Comments: It is new record from the Indian state of Uttar Pradesh. This Indian species belongs to the *helopeltidis* species group and mostly *E. (E.) lygivorous* confused with the *E. (E.) nuinu* by their similarities. Females of both species differ mainly on the basis of metasomal colouration. In *E. (E.) lygivorous*, the basal part of the first gastral tergite (T1) is brown and T2 yellow to light brown, so metasoma appear as yellow banded basally, while in *E. (E.) nuinu* the base of T1 and T2 of metasoma is completely white or pale yellow.

9. *Erythmelus* (*Erythmelus*) *nuinu* Triapitsyn

(Figures 208–213)

Erythmelus (Erythmelus) nuinu, Triapitsyn 2003: 30–33, Female. Russia, Primorskii Krai (ZISP, not examined).

Erythmelus (Erythmelus) nuinu, Triapitsyn: Manickavasagam *et al.*, 2011: 395–403, distributional records, key. Anis & Rehmat, 2013: 4, checklist. Manickavasagam & Rameshkumar, 2013: 564, checklist.

Diagnosis

Female. Body length, 0.8 mm. Head (Fig. 208) rounded and higher than broad (anterior). Vertex with transverse striations; face and gena with faint sculpture. Antenna (Fig. 208) with 6-segmented funicle; scape and pedicel with faint longitudinal striations and scape about 2.7–3.0x as long as pedicel and 5–5.4x longer than wide. All funicle segments longer than broad; F1–F5 without longitudinal sensillum; F1–F3 sub equal in length; F4 slightly longer than F5; F6 longest with 2 longitudinal sensilla; clava 3.35–3.7x longer than broad, with 5 longitudinal sensilla (3 subapical and 2 medial). Pronotum with transverse reticulations, 1+1 strong seta on each side lobe of pronotum; mesoscutum with fine longitudinal striation on mid lobe and transverse reticulations on side lobes. A pair of axillar setae long and strong, reaching almost half length of scutellum. Scutellum subequal to mesoscutum, finely longitudinal striate except towards anterior margin. Metanotum with a weak seta towards each lateral part. Propodeum short and smooth. Fore wing (Fig. 209) 4.3–4.5x longer than broad and longest marginal

fringe about 1.2–1.3x as long as wing width. Fore wing disc mostly bare except for a few setae at apex and few scattered setae towards apex as in fig. 209. Hind wing (Fig. 210) 17.3–17.8x as long as broad.

Metasoma (Fig. 212) Ovipositor length about 3/2 length of gaster, strongly to markedly exserted beyond apex of gaster (mostly about 1/2 of its own length, exserted part varies from 0.1–0.5x of total length of ovipositor) and loop strongly curved anteriorly; ovipositor and hind tibia ratio about is 2:2.2.

Colour. Head, mesosoma, and metasoma dark brown or almost black except eyes and ocilli dirty pink; mesoscutum with a lighter, narrow, transverse, median band; basal gastral tergite pale white; hypopygium brown. Antenna brown except F1 and inner sides of scape and pedicel light brown. Fore wing disc slightly infuscated basally and distally, rest hyaline; venation brown. Hind wings hyaline except apex, slightly infuscated. Mid and hind coxae (except basal part), trochanters, fore tibia, basal three tarsal segments of fore and mid tibia, basal half of hind tibia light brown.

Relative measurements (slide): DBT, 22; EH, 62; SCL, 65; SCW, 13; PL, 24; PW, 12; CLL, 67; CLW, 18; F1L, 10; F1W, 6; F2L, 11; F2W, 7; F3L, 12; F3W, 8; F4L, 15; F4W, 8; F5L, 13; F5W, 8; F6L, 25; F6W, 11; MESL, 170; MSCL, 60; SCTL, 55; PDL, 20; FWL, 250; FWW, 55; FFL, 70; HWL, 250; HWW, 14; HFL, 60; FFm, 80; FTb, 71; FTrs, 85; MFm, 70; MTb, 100; MTrs, 95; HFm, 65; HTb, 92; METL, 168; PETL, 13; PETW, 40; OVL, 210; Ext.OVL, 100.

Male. Similar to female except normal sexually dimorphic characters and fore wing. Antenna 13-segmented. Fore wing comparatively wider than female, disc much more pubescent at apex. (Genitalic characters given by Viggiani & Jesu, 1985).

Material examined: INDIA: UTTAR PRADESH, Mainpuri, Nagla Pachhava, 2 Females (on slide), 5.ix.2007, Coll. F.R. Khan; Firozabad, Nagla Prabhu, 1Female (on slide), 4. ix. 2007, Coll. F.R. Khan; Etah, Sakit, 2Female (on slides), 8.ix.2007, Coll. F.R. Khan; SIKKIM, Gangtok, Syari, 1Female (on slide), 1.vi.2008, Coll. F.R. Khan.

Additional material examined (on slide): INDIA: KERALA, Kottayam, 1 Female, 26.ii.1993; Coll. S.B. Zeya (determined by T. Rehmat).

Host. Unknown.

Distribution. India: Tamil Nadu, Kerala, Puducherry, Sikkim, Uttar Pradesh **(Present record)**. (Russia, China, Republic of Korea).

Comments. It is new record from Indian states of Sikkim and Uttar Pradesh. This species is closely related with *E. (E.) lygivorous* but also correlated with *E. (E.) helopeltidis* Gahan, 1949 by some characters: mid and hind tibia apices of females in *E. nuinu* are dark brown while in *E. helopeltidis* females, mid and hind tibia totally light brown. Above material examined is compared with the original description and figures, and found to be *E. (E.) nuinu*.

10. *Erythmelus (Erythmelus) helopeltidis* Gahan

(Figures 214–219)

Erythmelus helopeltidis, Gahan, 1949: 51–75, Female?. Malaysia (USNM, not examined).

Erythmelus helopeltidis, Subba Rao, 1970: 59–662.

Erythmelus helopeltidis, Subba Rao & Hayat, 1983: 20–134 (catalogue). Triapitsyn, 2003: 33 (compared with *E. nuinu*)

Diagnosis

Female. Body length, 0.83–0.81 mm. Head (Fig. 217). Vertex with transverse striations and a few short setae. Antenna (Fig. 214) with short setae; scape and pedicel with longitudinal striations, scape about 5x as long as wide, pedicel about 1.9x as long as broad; all funicle segments prominently longer than broad and F1–F5 subequal in length, F6 longest with 2 longitudinal sensilla; clava 3.35x as long as broad, with 5 longitudinal sensilla.

Mesosoma (Fig. 217). Mesoscutum with mid lobe with fine longitudinally striated and with 1 pair of strong setae, posterior scutellum finely longitudinally striate. Fore wing (Fig. 215) 4.4x as long as broad; longest marginal fringe 1.08x of wing width; disc with few setae in apical 1/4 part of the disc. Hind wing (Fig. 216) 12.5x as long as broad; longest marginal fringe about 3.15x as long as wing width.

Metasoma (Fig. 218). Petiole wider than long. Metasoma slightly shorter than mesosoma; ovipositor about 1.1x of gaster length, exserted beyond apical gastral tergum by about 0.25x of total length of ovipositor and much exserted beyond apex of hypopygium, ovipositor length and hind tibia ratio is 2:1.

Colour. Body dark brown except mesoscutum with a lighter, narrow, transverse, median band. Fore wing disc slightly infuscate behind venation but otherwise

hyaline. Hind wing slightly infuscate apically. Legs light brown to brown, mid and hind tibia light brown. Basal two gastral terga pale or white; hypopygium brown.

Relative measurements (slide): EH, 49; SCL, 70; SCW, 14; PL, 23; PW, 12; CLL, 67; CLW, 20; F1L, 14; F1W, 5; F2L, 13; F2W, 6; F3L, 13; F3W, 8; F4L, 14; F4W, 9; F5L, 14; F5W, 9; F6L, 26; F6W, 13; MESL, 170; MSCL, 45, SCTL, 60; PDL, 40; FWL, 265; FWW, 60; FFL, 65, HWL, 250; HWW, 20; HFL, 63; FFm, 70; FTb, 100; FTrs, 110; MFm, 70; MTb, 100; MTrs, 100; HFm, 80; HTb, 100; HTrs, 120; METL, 168; OVL, 200; Ext.OVL, 50.

Male. Similar to female except normal sexually dimorphic characters and fore wing. Antenna 13-segmented. Fore wing comparatively wider than female, disc much more pubescent at apex.

Material examined: INDIA: UTTAR PRADESH, Aligarh, 1 Female (on slide), 8.ix.1980, Coll. M. Hayat; Hapur, 1Female (on slide), 23.v.1980, Coll. Shujauddin (determined by M. Hayat as *Erythmelus helopeltidis*).

Host. Miridae (Hemiptera) (Subba Rao, 1970; Bhatt & Srikumar, 2012) from India.

Distribution. India: Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, Uttar Pradesh. (Indonesia, Malaysia, Java, Sri Lanka).

Comments. The author has not examined the specimens recorded by Subba Rao (1970), but the three females from Andhra Pradesh examined here were also collected in the same year and determined by M. Hayat as *E. helopeltidis*. This species differs from the other Indian species by the characters given in the key.

7. Genus *Himopolynema* Taguchi

(Figures 220–253)

Himopolynema Taguchi, 1977a: 137. Type species *Himopolynema hishimonus* Taguchi, by original designation.

Himopolynema Taguchi: Hayat & Anis, 1999a: 16, 18, diagnosis taxonomic, review, figures. Triapitsyn & Berezovskiy, 2002a: 3, 6, diagnosis, redescription, female, review, notes on type material. Hayat *et al.*, 2003: 1, 5, description, key, figures. Lin *et al.*, 2007: 1596, 37, cited in catalogue, classification, checklist, diagnosis, key, key to genera, review. Anis & Rehmat, 2013: 6, checklist. Manickavasagam & Rameshkumar, 2013: 566, checklist.

References. Triapitsyn & Berezovskiy, 2002a: 1–11, review of species from Primorskii kari (Russia).

Diagnosis

Female. Head with antenna 9-segmented, formula 1161; face with a pit next to each torulus. Pronotum with blunt spine-like or tricuspid setae; axilla with a seta each, reaching to about middle of the scutellum, propodeum with a mid-longitudinal canal of variable width. Fore wing long and narrow with long marginal fringe, arrangement of the discal setae just distad of venation in two distally strongly diverging lines. Tarsal formula 4-4-4. Petiole attached to gastral tergum.

Colour. Body dark brown to black except petiole honey yellow. Antenna honey yellow with clava dark brown head completely dark brown. Wings hyaline. Legs honey yellow; femora and tibiae brown to dark brown; tarsal segments 1–3 yellow, 4th dark brown.

Male. Similar to female, except for the genitalia and antennae. Antenna 13-segmented, with flagellum filiform, not differentiated into funicle and clava.

Hosts. Recorded from Cicadellidae (Lin *et al.*, 2007), Deltocephalinae (Cicadellidae) (Hayat & Anis, 1999a) and Machaerotidae (Noyes, 2015).

Distribution. Cosmopolitan.

Species. World, 11 species; India, 6 species (including one new record in present work).

Comments. The genus is distinguished from the genera of *Polynema* group on the basis of propodeal U-shaped submedian carinae, with variable oval median area; face with a pit next to each torulus and petiole attached to gastral tergum. Previously Hayat & Anis (1999a) described only two species of Genus *Himopolynema* Taguchi (1977) from India and later three more species added to Indian fauna by Hayat *et al.*, (2003). Currently this genus is represented in India by five species, three of them described on male.

Key to Indian species of *Himopolynema* (females)

1. Head with subantennal grooves absent; facial pits located in line with or below level of antennal toruli (Fig. 220); propodeum with lateral longitudinal ridges behind each spiracle absent; fore wing broad, clearly less than 4x as long as broad, with marginal fringe about 0.5x of wing width (Fig. 222); F2 at least as long as pedicel 2

-. Head with subantennal grooves present; facial pits located in line with or above level of antennal toruli (Fig. 227); propodeum with lateral longitudinal ridges behind each spiracle present; fore wing at least 4x as long as broad, with marginal fringe at least 0.75x of wing width (Fig. 229); F2 shorter than pedicel 3

2. Propodeum with 3 setae on each side of medial groove (Hayat *et al.*, 2003; Fig. 3); legs with coxae, femora and tibiae, except ends, dark brown ..... 1. *hexatricha* Hayat & Basha

-. Propodeum with a single seta on each side (Fig. 224); legs, including coxae, largely infuscate yellow-brown ..... 2. *haflongum* Hayat & Singh

3. Antennal toruli placed lower on face (Fig. 227), separated from transverse trabecula by about twice their own diameters 4

-. Antennal toruli placed higher on face, almost touching transverse trabecula (Fig. 244) 5

4. F1 distinctly shorter (about 0.6x) than F2; F2-6 longer than broad, F2 about 2.5x, and F6 about 1.5x, as long as broad; distal funicle segments cylindrical (Fig. 228); ovipositor long, anteriorly protruded and 2.5x as long as mid tibia (Fig. 232) ..... 3. *longiclavatum* Hayat & Anis

-. F1 slightly shorter than F2; F2 less than 2x as long as broad, and F6 nearly quadrate; distal funicle segments not cylindrical, basally narrowed and broadened apically (Fig. 236); ovipositor not protruded anteriorly, about 1.5x as long as mid tibia (Fig. 242) ..... 4. *hishimonus* Taguchi

5. Propodeal carinae narrow (Hayat *et al.*, 2003; Fig. 11); F4-F6 not cylindrical, narrow basally asymmetrically broadened apically (Hayat *et al.*, 2003; Fig. 9) ..... 5. *indicum* Hayat & Basha

-. Propodeal carinae broad (Fig. 250); F2 and F3 subequal, F4-F6 almost equal and broader then other funicle segments (Fig. 245) ..... 6. *parviscutum* Taguchi

1. ***Himopolynema hexatricha*** Hayat & Basha

Himopolynema hexatricha Hayat & Basha, 2003: 10(1):1–2, Female, India, Assam (NPC, not examined).

Himopolynema hexatricha Hayat & Basha: Anis & Rehmat, 2013: 6, checklist. Manickavasagam & Rameshkumar, 2013: 566, checklist.

Diagnosis

Female. Head with setae transparent. Mesosoma with blunt and transparent setae, mostly tricuspid; mesoscutum as long as scutellum; propodeum with 3 setae on each side of medial groove. Fore wing about 3.5x as long as broad, marginal fringe about 0.5x as long as wing width. Hind wing 18x as long as broad. Metasoma about 0.8x as long as mesosoma, T1 about 0.75x of gaster length; ovipositor almost equal to metasoma length.

Colour. Body dark brown to nearly black, petiole yellow. Antenna brown, becoming dark brown on clava. Wings hyaline. Legs, including coxae, dark brown; both end of femora and of tibiae yellowish; tarsal segments 1–3 whitish, 4th brown.

Male. Unknown.

Hosts. Unknown.

Distribution. India: Assam.

Comments. The above diagnosis is based upon the original description and illustrations given by Hayat & Basha, 2003. *H. hexatricha* close to *H. haflongum* by having F2 atleast as long as pedicel, Fore wing broad, clearly less than 4x as long asbroad but differ by propodeum with 3 setae on each side and legs with femora and tibiae, except ends dark brown.

2. *Himopolynema haflongum* Hayat & Singh

(Figures 220–226)

Himopolynema haflongum Hayat & Singh, 2003: 2–5, Female. India, Assam, Haflong (NPC, not examined).

Himopolynema haflongum Hayat & Singh: Anis & Rehmat, 2013: 6, checklist. Manickavasagam & Rameshkumar, 2013: 566, checklist.

Diagnosis

Female. Body length, 0.62 mm. Head (Fig. 220) with mandibles light brown and tridentate. Scape smooth; F2 longest (Fig. 221). Mesosoma (Fig. 226). Longer than gaster (126:100); propodeum with transparent setae. Fore wing (Fig. 222) 3.2x as long as broad. Metasoma (Fig. 226), 0.79x of mesosoma length; exserted ovipositor length 0.07x of gaster length.

Colour. Body dark brown to nearly black with violet luster (noted from card mounted specimen); head completely black. Antenna brown except clava dark brown. Petiole yellow. Wings hyaline. Legs brown except distal part of femur and tibia dark brown; tarsal segments 1–3 yellow, 4th dark brown.

Relative measurements (slide): HW, 93; HL, 55; EH, 36; FVW, 58; TL, 10; TMMD, 23; DBT, 34; SCL, 28; SCW, 12; PL, 22; PW, 12; CLL, 60; CLW, 24; F1L, 15; F2L, 24; F3L, 16; F4L, 14; F5L, 10; F6L, 11; MESL, 126; MSTL, 45; SCTL, 48; PDL, 15; FWL, 250; FWW, 76; FFL, 46; HWL, 230; HWW, 14; HFL,

39; FTb, 55; FBstr, 32; MTb, 75; MBstr, 32; HTb, 80; HBstr, 30; METL, 100; METW, 74; PETL, 30; OVL, 81; Ext.OVL, 7.5.

Male. Unknown.

Material examined: INDIA: WEST BENGAL: Islampur, Sibdargi Para, 1Female (on slide), 10.vi. 2008, Coll. F. R. Khan.

Hosts. Unknown.

Distribution. India: Assam, West Bengal.

Comments. The holotype of *H. haflongum* is in the NPC and could not be examined. Therefore, the above specimen is compared with the original description and figures and found to be conspecific with *H. haflongum.*

3. ***Himopolynema longiclavatum*** Hayat & Anis

(Figures 227–232)

Himopolynema longiclavatum Hayat & Anis, 1999a: 18-20, Female. India, Kerala, Calicut University Campus (BMNH, not examined).

Himopolynema longiclavatum Hayat & Anis: Anis & Rehmat, 2013: 6, checklist. Manickavasagam & Rameshkumar, 2013: 566, checklist.

Diagnosis

Female. Body length, 0.82 mm. Head (Fig. 227). Scape striated; F1 shortest; F4–F6 subequal in length, clava elongated and longer than broad, 4.5x as long as broad. Mesosoma (Fig. 230) shorter than metasoma 0.65x of gaster length; mesoscutum 0.9x as long as scutellum; pronotum clearly visible in dorsal view of thorax. Fore wing (Fig. 229) 5.5x as long as broad. Hind wing 28.6x as long as broad. Metasoma (Fig. 232) longer than mesosoma, about 1.52x of thorax length exserted ovipositor length 0.07x of gaster length.

Colour. Body black except petiole yellow. Antennal clava dark brown and shiny; scape yellowish brown; funicle segments brown. Wings hyaline and broad apically.

Legs dark brown proximal half of fore, mid and hind tibiae yellow brown; tarsal segments 1–3 whitish, 4th dark brown. Metasoma black and shiny.

Relative measurements (slide): HW, 86; EH, 41; CPW, 35; FVW, 55; TL, 9; TMMD, 18; SCL, 95; PL, 22; FnL, 90; CLL, 68; CLW, 15; F1L, 8; F2L, 17; F3L, 17; F4L, 15; F4W, 5; F5L, 15; F5W, 6; F6L, 15; F6W, 7; MESL, 115; MESW, 70; MSCL, 44; SCTL, 47; FWL, 275; FWW, 50; FFL, 52; HWL, 258; HWW, 9; HFL, 36; FTb, 57; FBstr, 32; MTb, 78; MBstr, 45; HTb, 98; HBstr, 43; METL, 175; PETL, 34; OVL, 140; Ext. OVL, 13.

Male (Fig. 233). Similar to female except for the antenna and shape of gaster. Mandibles quadridentate. Propodeal carinae as in fig. 234. Genitalia with subrectangular phallobase, aedeagus distally very thin, and digiti well-developed, each digitus with two denticles.

Material examined. INDIA: WEST BENGAL: New Jalpaiguri, Chatt Purdanpura; 2Females (on slide), 30.v.2008, Coll. F.R.Khan.

Additional material examined. INDIA: KARNATAKA: Mysore, Brindavan garden, 1Male (on slide), 7.iii.1993, Coll. S.B. Zeya (determined by M. Hayat as *Himopolynema longiclavatum*) (ZDAMU).

Hosts. Unknown.

Distribution. India: Kerala, Karnataka, Tamil Nadu, West Bengal.

Comments. The holotype of *H. longiclavatum* is in the BMNH and could not be examined. Therefore the above specimen is compared with original description and figures, and found to be conspecific with *H. longiclavatum*. Author has described male of *H. longiclavatum* from the determined material present in ZDAMU.

4. *Himopolynema hishimonus* Taguchi

(Figures 235–243)

Himopolynema hishimonus Taguchi, 1977a: 137, Female, Male. Japan (ELEU, not examined)

Himopolynema hishimonus Taguchi: Hayat & Anis, 1999a: 16, 18. Triapitsyn & Huber, 2000: 614. Triapitsyn & Berezovrskiy, 2002a: 3, 6. Hayat *et al.*, 2003: 1, 5, illustrations. Hayat *et al.*, 2008: 328. Anis & Rehmat, 2013: 6, checklist. Manickavasagam & Rameshkumar, 2013: 566, checklist. Rehmat & Anis, 2014: 57, records.

Diagnosis

Female. Body length, 0.66 mm. Head (Fig. 235) in frontal view 1.2x as long as broad. Mandibles tridentate. Antenna (Fig. 50) with pedicel longer than F1 length. Mesosoma (Fig. 240). With slightly longer than gaster; pronotum with 4+4 setae; each axilla indistinctly divided from scutellum and with a long seta; canal of propodeum narrow. Fore wing broad apically, about 4.8x as long as broad, venation and discal setation as in fig. 238. Hind wing (Fig. 239) 29x as long as broad. Fore tibiae with a row of seven tooth- like spines on the inner lateral surface. Metasoma (Fig. 242). 0.96x of thorax length; exserted ovipositor length 0.3x of gaster length.

Colour. Body dark brown to black except petiole which is honey yellow. Antenna honey yellow with clava dark brown head completely dark brown. Wings hyaline. Legs honey yellow; femora and tibiae brown to dark brown; tarsal segments 1–3 yellow, 4th dark brown.

Relative measurements (slide): HW, 82; HL, 73; EH, 40; CPW, 20; FVW, 49; TL, 8; TMMD, 27; SCL, 30; SCW, 22; PL, 21; PW, 11; CLL, 49; F1L, 10; F2L, 12; F3L, 9; F4L, 9; F5L, 10; F6,L 11; MESL, 99; MSTL, 34; MSTW, 58; SCTL 43; SCTW, 38; FWL, 252; FWW, 52; FFL, 58; HWL, 232; HWW, 8; HFL, 32; MTb, 72; MBstr, 33; METL, 96; METW, 60; OVL, 92; Ext. OVL, 30.

Male. Differs from the female in the antennal structure and genitalia (Fig. 243). Antenna as in figure 237.

Material examined. INDIA: UTTAR PRADESH: Gonda, Poterganj, 1Male (on slide), 7.x.2006, Coll. F.R. Khan; WEST BENGAL: Cooch Behar, Mati Khata, 1Female, 1Male (on slide), 25.v.2008, Coll. F. R. Khan; New Jalpaiguri, Chatt Purdanpura; 2Female (on slides), 30.v.2008, Coll. F. R. Khan; Islampur, Gudish Basti, 1Female (on slide), 7.vi.2008, Coll. F.R. Khan; New Alipurduar, Marich Bari, 1Female (on slide), 20.v.2008, Coll. F.R. Khan.

Additional material examined: INDIA: BIHAR: Chakradharpur, 1Female (on slide), 23.ii. 1994, 1Female (on slide), Coll. S.B. Zeya & S.I. Kazmi; Ranchi, 1Female (on slide), 27.ii.1994, Coll. S.B. Zeya; UTTAR PRADESH: Gonda, Rajpura, 1Female (on slide), 8.x.2006, Coll. F.R. Khan; Balrampur, Sasai Ghat, 1Male (on slide), 6.x.2006, Coll. F.R. Khan; WEST BENGAL: Maithan Dam, 1Female (on slide), 7.iii.1993, Coll. F.R. Khan. (ZDAMU)

Host. Unknown from India. In Japan reared from eggs of *Hishimonus sellatus* (Uhler) (Deltocephalidae).

Distribution. India: Andhra Pradesh, Assam, Bihar, Tamil Nadu, Uttar Pradesh, Jharkhand, West Bengal.

Comments. I have also examined the specimens recorded by Hayat & Anis (1999a) and Hayat *et al*., (2003, 2008). The specimens recorded here were compared with the specimens present in ZDAMU. *Himopolynema hishimonus* differs from the other Indian species by the characters given in the key.

5. *Himopolynema indicum* Hayat & Basha

Himopolynema indicum Hayat & Basha, 2003: 10(1): 4–5, Female. India, Assam (NPC, not examined).

Himopolynema indicum Hayat & Basha: Anis & Rehmat, 2013: 6, checklist. Manickavasagam & Rameshkumar, 2013: 566, checklist.

Diagnosis

Female. Head with transparent setae. Mesosoma with long blunt setae; propodeal carinae narrow. Fore wing about 4.5x as long as broad; marginal fringe 0.8x as long

as wing width. Hind wing 18x as long as broad. Metasoma slightly shorter than thorax; T1 about 0.5x of gaster length. Ovipositor subequal to metasoma.

Colour. Body dark brown to nearly black; petiole yellow. Antenna brown. Wing hyaline. Legs with coxae and trochanters yellow-brown; femora dark brown; fore and mid tibia yellow-brown; hind tibia yellow with distal third brown; tarsal segments 1–3 whitish, 4th brown.

Male. Unknown.

Host. Unknown.

Distribution. India: Assam.

Comments. The above diagnosis is based upon the original description and illustrations given by Hayat & Basaha, 2003. *H. indicum* differ by other species of the genus by antennal toruli placed higher on face, almost touching transverse trabecula. F1 2x as long as broad, shorter than F2; distal funicle segments not cylindrical, narrow basally, asymmetrical broadened apically.

6. *Himopolynema parviscutum* Taguchi

(Figures 244–253)

Himopolynema parviscutum Taguchi, 1977, Male. Japan, Taiwan, Kenting Park (ELEU, not examined)

Himopolynema parviscutum Taguchi, 1977: Triapitsyn & Berezovskiy, 2002: 5.

Description

Female. Body length, 0.8 mm.

Head (Fig. 244) with mandibles quadridentate, facial pits located in line above level of antennal toruli. Scape (Fig. 245) striate transversely reticulate with 8 setae, pedicel smooth with 5 setae; F2 and F3 subequal in length, F1 (0.7x as long as F2), F4–F6 almost equal in length but F4–F6 broader then other funicle segments, clava 2.7x as long as broad with 6 longitudinal sensilla (2 medial and 4 apical).

Mesosoma (Fig. 249). Almost equal to metasoma; pronotum undivided medially with blunt setae, axillar setae reaching half of the scutellum length, scutellar placoid sensilla situated towards posterior margin of scutellum; propodeum with broad mid-longitudinal canal (canal width subequal to F1 length) as in fig. 250. Fore wing (Fig. 247) 4.3x as long as broad, marginal fringe about 0.7x of wing width. Hind wing (Fig. 248) 18.3x as long as broad.

Metasoma (Fig. 253). Petiole about 1.4x as long broad; ovipositor exactly equal to thorax length; exserted ovipositor length 0.07x of gaster length.

Colour. Body black and glossy-shiny except mandibles golden brown, blunt setae on head and thorax dark brown. Petiole yellow, scape and pedicel yellow brown; funicle nearly brown, clava dark brown. Wings hyaline. Legs dark brown and a little shiny, mid and hind trochanters yellow brown; pro tibiae, proximal half of both meso and meta tibiae and tarsal segments 1–3 whitish, last tarsal segment brown.

Relative measurements (slide): HL, 70; EH, 48; FVW, 58; POL, 38; DBT, 38; SCL, 30; SCW, 12; PL, 24; PW, 12; CLL, 58; CLW, 21; F1L, 11; F1W, 7; F2L, 15; F2W, 5; F3L, 14; F3W, 5; F4L, 11; F4W, 8; F5L, 10; F5W, 8; F6L, 11; F6W, 9; MESL, 135; MSCL, 53; SCTL, 40; PDL, 18; FWL, 285; FWW, 65; FFL, 48; HWL, 238; HWW, 13; HFL, 40; FTb, 60; FBstr, 30; FTrs, 82; MTb, 82; MTrs, 100; HTb, 105; HBstr, 50; HTrs, 115; METL, 137; METW, 88; PETL, 22; OVL, 137; Ext. OVL, 10.

Male (Fig. 246). Body shiny black except for petiole honey yellow, antennal segments and legs dark brown except fore legs, the anterior third of tibiae and tarsal segments of hind legs honey yellow, eyes reddish black. Head and thorax with indented setae; scape roughly sculptured with five abrupt setae, canal of propodeum with ten tuberculi, evidently wider than that of *H. hishimonus* as in fig. 252, fore tibiae with a row of five thooth-like spines; hind coxae with several short setae on the dorsal surface (Taguchi, 1977).

Material examined. INDIA: KERALA: Pathanamithitta, Varayapuram, 1Female (on slide), 15.i.2012, Coll. F. R. Khan.

Additional material examined: HIMACHAL PRADESH, Solan, Brewery, 1Male (on slide), 17.vi.2006, Coll. S.M.A. Badruddin & F.R. Khan (determined by M. Hayat as *Himopolynema parviscutum*) (ZDAMU).

Hosts. Unknown.

Distribution. India: Himachal Pradesh, Kerala **(Present record).**

Comments. *Himopolynema parviscutum* based on male described by Taguchi (1977). M. Hayat in 2001 also determined a male from Himachal Pradesh. I have found a female of *H. parviscutum*, it is new record from Indian state of Kerala. The species closely resembles to *Himopolynema indicum* from having antennal toruli placed on higher on face; F1 almost 2x as long as broad and slightly shorter than F2, fore wing at least 4x as long as broad, but differ by having F2 and F3 subequal in length, F1 (0.7x as long as F2), F4–F6 almost equal in length but F4–F6 broader then other funicle segments; broad propodeal canal as in fig. 250. [In *H. indicum:* F4–F6 not cylindrical, narrow basally, asymmetrical broadened apically; narrow propodeal canal (Hayat *et al.*, 2003; Fig. 9)].

8. Genus *Litus* Haliday

(Figures 254–272)

Litus Haliday, 1833: 269, 345. Type species *Litus cynipseus* Haliday 1833, by designation of Gahan & Fagan, 1923: 81.

Neolitus Ogloblin, 1935: 60. Type species *Neolitus argentinus* Ogloblin, 1935, by original designation. Synonymized by Triapitsyn & Berezovskiy, 2004:4.

Litus Haliday, 1833: Rehmat & Anis, 2009: 370, diagnosis, description females from Indias. Anis & Rehmat, 2013: 6, checklist. Manickavasagam & Rameshkumar, 2013: 566, checklist.

References. Triapitsyn & Berezovskiy, 2004: 1–24, review of species from Holarctic and Oriental regions.

Diagnosis

Female. Body robust (Fig. 267), highly sclerotized; head and thorax strongly sculptured (Fig. 261). Head with mandible unidentate or bidentate, sometimes longer than malar space. Antennal formula, 1161; funicle segments (Fig. 263) without longitudinal sensillum; clava unsegmented, usually with 4 longitudinal sensilla. Mesoscutum (Fig. 266) usually with distinct notauli; scutellum with distinct anterior and posterior parts, the latter longer than the former; mesophragma (Fig. 272) projecting into gaster and usually with apex rounded. Fore and hind wing (Figs 264 & 265) long and narrow, with very long marginal fringe; marginal vein of fore wing long. Legs with coxae usually strongly reticulate; tarsal formula 5–5–5. Petiole broader than long. Gaster with first tergite long. Ovipositor (Figs 265 & 272) length variable, either short or long, and hidden or slightly to strongly exserted at apex.

Colour. Body colour dark brown except distal last tergite of gaster and legs light brown. Antenna dark brown. Fore wing hyaline; hind wings subhyaline.

Male. Unknown.

Host. Gregarious egg parasitoids of large Staphylinidae (Coleoptera) (Triapitsyn & Berezovskiy, 2004).

Distribution. It is nearly cosmopolitan, known from all the zoogeographical regions, except Australia and New Zealand.

Species. World, 16 species including extinct species (Rehmat *et al.*, 2009); India, 3 species, including one new species in present work.

Comments. The genus is distinguished from other genera by robust and higly sclerotized body; head and thorax strongly sclerotized; very long narrow wings with long marginal fringe. Two Indian species were described from India by Rehmat *et al.*, (2009).

Key to Indian species of genus *Litus* (females)

1. Anterior margins of frons with denticles (Fig. 261) 2
-. Anterior margins of frons without denticles (Fig. 254) ..... 1. *assamensis* sp. nov.
2. Ovipositor originates from near base of gaster, and strongly exserted at apex (Fig. 272), exserted part 0.39x of gaster length; ovipositor 1.98x as long as mid tibia and 1.48x as long as hind tibia ..... 2. *triapitsyni* Rehmat & Hayat
-. Ovipositor originates from basal fourth of gaster and very slightly exserted (Fig. 267), the exserted part about 0.17x of gaster length; ovipositor 1.65x as long as mid tibia and 1.30x as long as hind tibia ..... 3. *huberi* Rehmat & Anis

1. *Litus assamensis* sp nov.

(Figures 254–260)

Description

Female. Body length, 0.35 mm.

Head (Fig. 254). Frontovertex broad, about 0.9x of head width; frons without any row of denticles; antennal toruli removed from transverse trabecula by a diatance exactly equal to diameter of a torulus; ocellar triangle with apical angle strongly obtuse; posterior ocelli nearly touching supraorbital trabecula; frons with several minute tubercles. Vertex with wide-meshed reticulations, temples strongly reticulate. Mandibles unidentate, slightly longer than malar space (Fig. 254). Antenna as in fig. 255; scape with longitudinal striations, pedicel longer than F1 covered with fine longitudinal striations; all funicle segments are longer than broad;

F1 and F3 equal in length, F2 longest, F4, F5 and F6 subequal in length. F6 slightly broader than the preceeding funicle segments; clava about 2.4x as long as wide, much longer than length of preceding 5 funicle segments (F2-F6) combined, and with 4 longitudinal sensilla.

Mesosoma (Fig. 259). Compact, strongly sclerotized (characterstic of the genus); highly sculptured except pronotum lightly sculptured and short; mesoscutum slightly longer than half of scutellum, with raised reticulate sculpture, and with 2+2 setae, notular lines not clear, axilla with 1+1 seta; scutellum with raised reticulations except anterior scutellum; propodeum with reticulation and 1+1 seta. Fore wing (Fig. 256) 26x as long as broad, disc almost bare except 2 setae present in the middle of the disc and a row of setae along anterior and posterior margin (about 18 setae). Hind wing (Fig. 258) 33.3x as long as broad, disc with a line of setae. Legs with sclerotized coxae.

Metasoma (Fig. 260). Longer than metasoma (75:55); first tergite (T1) long and covered 1.5 or 3/2 part of gaster length last tergite conical (TVII); ovipositor (Fig. 260) short about 0.6x of gaster length and not exserted.

Colour. Body colour (taken from slide mounted specimen) dark brown except distal last tergite of gaster and legs light brown. Antenna dark brown. Fore wing hyaline; hind wings subhyaline.

Relative measurements (slide): HW, 48; HL, 50; FVW, 45; TL, 5; TMMD, 20; DBT, 20; SCL, 50; SCW, 7; PDL, 16; PDW, 9; CLL, 44; CLW, 18; F1L, 11; F1W, 4; F2L, 12; F2W, 4; F3L, 11; F3W, 4; F4L, 10; F4W, 4; F5L, 10; F5W, 5; F6L, 10; F6W, 7; MESL, 55; MSCL, 18; SCTL, 31; FWL, 210; FWW, 8; FFL, 80; HWL, 200; HWW, 6; HFL, 68; MTb, 50; HTb,70; HTrs, 78; METL, 78; OVL, 50.

Male. Unknown.

Material examined. *Holotype* Female (on slide under 4 coverslips); INDIA: ASSAM: Guwahati, Kontola, 28.x.2008; Coll. F.R. Khan.

Hosts. Unknown.

Distribution. India: Assam.

Etymology. The species name is named after the collection state from where the holotype was collected.

Comments. This species seems very close to *L. sutil* Triapitsyn & Berezovskiy, by head strongly sculptured, absence of denticles, scape with longitudinal striations, pedicel longer than F1, F2 longest and F3–F6 subequal in length, F6 slightly broader than preceeding funicle segments but differ by pedicel with longitudinal striations, clava 2.5x as long as wide; fore wing 2.6x as long as broad disc; ovipositor 0.6x of gaster length. (In *L. sutil*: pedicel without longitudinal striations, clava 3.5x as long as broad; fore wing 21x as long as broad; ovipositor 2.07x of gaster length).

2. *Litus huberi* Rehmat & Anis

(Figures 261–266)

Litus huberi Rehmat & Anis, 2009: 370–374, Female. India, Assam, Guwahati, Kontola (NPC, examined)

Litus huberi Rehmat & Anis: Anis & Rehmat, 2013: 6, checklist. Manickavasagam & Rameshkumar, 2013: 566, checklist.

Diagnosis

Female. Body length, 0.41 mm (Holotype). Head (Fig. 261). Frontovertex broad, about two-thirds of head width; frons with a slightly curved line of prominent denticles (Fig. 262); clypeus with a median apically pointed lobe (Fig. 261); antennal toruli removed from transverse trabecula by a distance slightly greater than diameter of a torulus; ocellar triangle with apical angle strongly obtuse; posterior ocelli nearly touching supraorbital trabecula; frons with several minute tubercles. Vertex with wide-meshed reticulations; temples strongly reticulate. Mandible unidentate, long, longer than malar space (Figs. 262) mandibles appear shorter as the figure was drawn in dorso-lateral view). Antenna as in fig. 263; first, fifth and sixth funicle segments (F1, F5, F6) quadratic, F2–4 slightly longer than broad, F2 longest; clava un-segmented, about 2.4x as long as broad, subequal or slightly shorter than preceding 5 funicle segments combined, and with 4 longitudinal sensilla. Mesosoma (Fig. 266). Compact, strongly sclerotized (characteristic of the genus); pronotum not visible in dorsal view of thorax, strongly reticulate, the cells laterally elongate and

medially convergent; mesoscutum short, not more than half the length of scutellum, with raised reticulate sculpture, and with 2+2 setae, mesoscutum without notaular lines; posterior scutellum with prominent raised reticulate sculpture compared to sculpture on anterior scutellum; propodeum posterior half behind transverse ridge narrowed and with prominent longitudinal ridges (*Fig. 266*). Fore wing disc (=blade) narrow, apically pointed (Fig. 264); and about 22.6x as long as broad; disc almost bare, except for 2-3 setae just distal of venation, and a row of 5–6 setae along posterior margin in middle of disc; venation characteristic of *Litus* species. Hind wing (Fig. 265) 24.5x (in holotype) and 24.5x (present specimen) as long as broad, disc with a line of setae. Legs with coxae strongly sclerotized. Metasoma (Fig. 267). Metasoma longer than mesosoma; first tergite (TI) long, occupying nearly three-fourths of gaster length; other tergites appear strongly transverse (retracted within gaster); last tergite (TVII) apically conical; ovipositor short, exserted to 0.17x of gaster length.

Colour. Body except distal three tergites of gaster which are brownish-yellow, dark brown to black, shiny; ovipositor sheaths dark brown. Mandibles pale yellow. Antennae dark brown. Fore wing lightly infuscate, hyaline in apical third. Hind wing sub-hyaline. Legs with coxae black; femora and tibiae brown to dark brown; tarsi brownish.

Relative measurements (slide). EH, 20; FVW, 40; DBT, 20; SCL, 50; SCW, 8; PDL, 16; PDW, 8; CLL, 37; CLW, 15; F1L, 6; F1W, 4; F2L, 7; F2W, 4; F3L, 8; F3W, 5; F4L, 8; F4W, 5; F5L, 7; F5W, 6; F6L, 7; F6W, 6; MESL, 62; MSCL, 15; SCTL, 32; PDL, 15; FWL, 181; FWW, 8; FFL, 70; HWL, 180; HWW, 6; HFL, 75; FFm, 40; FTb, 32; FTrs, 50; MFm, 60; MTb, 42; MTrs, 40; HFm, 40; HTb, 60; HTrs, 60; METL, 98; OVL, 50; Ext. OVL, 10.

Male. Unknown.

Type material examined. *Holotype* Female (on slide under 3 coverslips), INDIA: ASSAM: Guwahati, Kontola, 28.x.2008, Coll. F.R. Khan. (NPC), Registration No. 13/6/70/3.

Paratype Female (on slide under 3 coverslips), INDIA: ASSAM: Guwahati, Borkusi, 28.x.2008, Coll. F.R. Khan. (ZDAMU), Registration No. HYM/CH. 577.

Additional material examined. INDIA: KERALA: Ernakulam, Amballur, 10. i. 2012. Coll. F.R. Khan.

Hosts. Unknown.

Distribution. India: Assam, Kerala **(present record).**

Comments. It is new record from Indian state of Kerala. As noted by Rehmat & Anis (2009), this species appears to be very close to *L. sutil* Triapitsyn & Berezovskiy (2004) in having narrow fore wing blade, but differs from *sutil* in having funicle segments shorter, quadrate (F1,5,6) to only slightly longer than broad (F2,3,4), clava about 2.3x as long as broad; fore wing disc straight; gaster 1.25x as long as thorax; and ovipositor occupying about three-fourths length of gaster, and clearly longer than both mid and hind tibiae, 1.62x as long as mid tibia and 1.30x as long as hind tibia; face with a row denticles. (In *sutil*: funicle segments all longer than broad, each not less than 2x as long as broad; clava about 3.5x as long as broad; fore wing disc apically curved; ovipositor short, occupying about one-third length of gaster, and clearly shorter than mid and hind tibiae, 0.50x of mid tibia and 0.41x of hind tibia; probably also the row of facial denticles absent in *sutil*).

3. *Litus triapitsyni* Rehmat & Hayat

(Figure 268–272)

Litus triapitsyni Rehmat & Hayat, 2009: 370-374, Female. India, Assam, Guwahati, Koylajol (NPC, examined).

Litus triapitsyni Rehmat & Hayat: Anis & Rehmat, 2013: 6, checklist. Manickavasagam & Rameshkumar, 2013: 566, checklist.

Diagnosis

Female. This species is very similar to *L. huberi* Rehmat & Anis, in body colour, various dimension of body parts, and sculpture, but differs only in the following characters: Anterior margin of frons biconvex with a row of large denticles; funicle

segments (Fig. 269) all longer than broad, F1 1.5x, F2 and F3 2x, F4 1.75x, and F5 and F6 each a little longer than broad; clava 2.3x as long as broad; ovipositor originates from near base of gaster, and strongly exserted at apex, the exserted part 0.39x of gaster length (Fig. 272).

Male. Unknown.

Hosts. Unknown.

Distribution. India: Assam.

Comments. This species is very close to *L. huberi* Rehmat & Anis, but differs in having the anterior margin of frons with two convex lobes provided with large denticles; ovipositor originates from near base of gaster, and strongly exserted at apex, exserted part 0.39x of gaster length; ovipositor 1.98x as long as mid tibia and 1.48x as long as hind tibia. (In *huberi*: anterior margin of frons slightly convex, with a row of large denticles; ovipositor originates from basal fourth of gaster and very slightly exserted, the exserted part about 0.17x of gaster length; ovipositor 1.65x as long as mid tibia and 1.30x as long as hind tibia).

9. Genus *Palaeoneura* Waterhouse

(Figures 273–289)

Palaeoneura Waterhouse, 1915: 537–538. Soyka, 1956:107. Annecke & Doutt, 1961: 30–31. Type species *Palaeoneura interrupta* Waterhouse, designated by Gahan & Fagan, 1923:103.

Chaetomymar Ogloblin, 1946: 277. Type species *Chaetomymar kusnezovi* Ogloblin, by original designation. Synonymized by Triapitsyn & Berezovskiy, 2007: 38.

Acanthomymar Subba Rao, 1970: 667. Type species *Acanthomymar nigrum* Subba Rao, by original designation. Synonymized by Triapitsyn & Berezovskiy, 2007: 38.

Palaeoneura Waterhouse: Triapitsyn & Berezovskiy, 2007: 38–44, synonymy, redescription, diagnosis, distribution, checklist of species, definition of species groups, comments, key to Australian *Polynema*-group genera. Manickavasagam *et al.*, 2011: key to Indian species. Anis & Rehmat, 2013: 6, checklist. Manickavasagam & Rameshkumar, 2013: 566, 567, checklist.

References. Triapitsyn & Berezovskiy , 2007: 38–46, taxonomic notes on species from Oriental and Australasian regions.

Diagnosis

Female. Face without a pit next to each torulus sometimes a medial groove extending from transverse trabecula to level of toruli and fine sculpture perpendicular to this groove. Mandibles tridentate (Fig. 273). Antennal formula 1161. Clava solid with 5–9 longitudinal sensilla; F6 sometimes with one longitudinal sensillum or rarely on F5 and F6 (Fig. 274). Mesosoma with propleura abutting each other anteriorly along midline, thus prosternum closed anteriorly and long axillar setae. Scutellum (Fig. 282) with placoid sensillum usually in middle but sometimes in posterior half and much closer to each other. Propodeum smooth or sometimes with a short median carinae extending from posterior margin up to half the length of propodeum. Fore wing (Fig. 281) narrow with a slight narrowing just

beyond apex of venation, relatively long venations with 2 dorsal macrocheta. Tarsal formula 4-4-4. Petiole attached to gastral tergum.

Colour. Body mostly yellow in colour, clava dark brown and males generally light brown. Fore wing disc with or without infuscated bands or spots

Male. Similar to female having 13-segmented antenna as in fig. 280.

Host. Recorded from eggs of Cicadellidae (from formerly placed synonimized genus *Chaetomymar*) [Huber, 2003].

Distribution. Cosmopolitan.

Species. World, 49 species (Noyes, 2015); India, 4 species.

Comments. Genus *Palaeoneura* differ from other genera of the family on the basis of fore wing usually narrow with slightly narrowing beyond apex of venation; axillar setae long and blunt extending about half of scutellum length. It is generally confused with *Polynema* by certain characters as follows: face without pits next to toruli; petiole attached to gastral tergum and propleura abutting anteriorly.

Only four species are recorded from India up till now. Previously *Palaeoneura unimaculatum* & *Palaeoneura indopenensularis* was described under genus *Acmopolynema* & *Polynema* by Hayat & Anis (1999b & c) and Mani & Saraswat (1973) as *Acmopolynema unimaculatum* and *Polynema indopeninsularis* respectively, later comb. nov. by Triapitsyn and Berezovskiy (2007). Narayanan, Subba Rao & Kaur (1960) misidentified *Palaeoneura sophoniae* as *Chetomymar bagicha.* Recently Manickavasagam *et al.*, (2011) provided key to Indian species of genus *Palaeoneura.*

Key to Indian species of genus *Palaeoneura* Waterhouse (females)

(Modified from Manickavasagam *et al.*, 2011)

1. Fore wing with two brown bands, one medial and one apical (Fig. 275) 2
-. Fore wing with one brown band, apical (Hayat & Anis, 1999b; Fig. 3) .....
..... 1. *unimaculata* (Hayat & Anis)

2. Fore wing with apical brown band with basal margin of band straight (Fig. 275) ..... 2. *sophoniae* Huber

-. Fore wing apical band not strongly concave (Fig. 287) 3

3. Fore wing with basal margin of apical brown band wider along anterior margin (Fig. 281). ..... 3. *bagicha* (Narayanan, Subba Rao & Kaur)

-. Fore wing with basal margin apical brown band dark and large in size along posterior margin (Fig. 287) ..... 4. *indopeninsularis* (Mani & Saraswat)

1. *Palaeoneura unimaculatum* (Hayat & Anis)

Palaeoneura unimaculata (Hayat & Anis, 1999b): Triapitsyn & Berezovskiy, 2007: 44. (comb. nov.)

Acmopolynema unimaculatum Hayat & Anis, 1999b: 299-300. Holotype Female, (BMNH, not examined) Walayar Forest, Palghat, Kerala, India.

Palaeoneura unimaculata (Hayat & Anis): Manickavasagam *et al.*, (2011), key. Anis & Rehmat, 2013: 6, checklist. Manickavasagam & Rameshkumar, 2013: 566, 567, checklist.

Diagnosis.

Female. Body length, 1.0 mm. Scape at least 2x as long as broad, F1 about slightly longer than pedicel.

Colour. Antenna brown except pedicel and funicle pale yellow-brown becoming brownish distally. Fore wing with one dark apical infuscated patch adjacent to anterior margin; propodeum smooth without any carinae and dark brown body. Legs with all coxae and hind femur dark brown; fore and mid femur and all tibiae brown to light brown. Tarsal segments 1–3 white, 4th segment light brown.

Male. Unknown.

Hosts. Unknown.

Distribution: India: Jammu & Kashmir, Karnataka, Kerala, Tamil Nadu.

Comments. This species earlier described by Hayat and Anis, 1999b as *Acmopolynema unimaculatum* later transferred to *Palaeoneura* as new combination by Triapitsyn and Berezevisky (2007) on the basis of absence of propodeum carinae, presence of long axillar setae.

2. *Palaeoneura sophoniae* Huber

(Figures 273–278)

Palaeoneura saphoniae Huber, 2003: Triapitsyn & Berezovskiy, 2007:40. comb. nov.

Chetomymar sophoniae Huber, 2003: 89, by original designation.

Chetomymar bagicha (Narayanan, Subba Rao & Kaur). Beardsley & Huber, 2000: 12 (misidentification).

Palaeoneura saphoniae Huber: Manickavasagam *et al.*, (2011), key. Anis & Rehmat, 2013: 6, checklist. Manickavasagam & Rameshkumar, 2013: 567, checklist.

Diagnosis

Female. Body length, 0.64 mm. Head (Fig. 273) vertex, gena with blunt setae and face with pointed setae. Mandibles tridentate. Antenna (Fig. 274) with scape about 2.2x as long as broad, pedicel smaller than F1, about 2x as long as wide; F2 longest, F3 longer than F4, F5 and F6 almost subequal in length and each little shorter than F4; F6 with one longitudinal sensillum; clava about 5.5x as long as broad with 7 sensilla. Mesosoma (Fig. 277) almost subequal to metasoma; pronotum with slong and pointed setae, mesoscutum equal to scutellum, propodeum with median carinae reaching half of the propodeum towards anterior margin with 1+1 setae close to posterior margin and median carinae. Fore wing about 6.7x as long as broad, longest marginal fringe about 1.9x as long wing width. Hind wing 28x as long as broad; marginal fringe about 7.14x as long as wing width. Metasoma (Fig. 278) with petiole longer than hind coxae, ovipositor 0.9x as long as gaster length, slightly exserted ovipositor about 0.09x as long as its total length; ovipositor and hind tibia ratio is 1.08 : 1.

Colour. Body brownish yellow except posterior scutellum, propodeum, middle of gaster and clava dark brown. Legs light yellow except last tarsal segments. Fore wing hyaline with two infuscated band one apically and medially; apical band with basal margin almost straight and dark throughout. Hind wings with extreme apex brown.

Relative measurements (slide): FVW, 50; EH, 33; POL, 25; DBT 30; SCL, 22; SCW, 10; PDL, 20; PDW, 10; CLL, 50; CLW, 19; F1L, 24; F1W, 3; F2L, 40; F2W, 4; F3L, 36; F3W, 3; F4L, 27; F4W, 5; F5L, 22; F5W, 5; F6L, 20; F6W, 7; MESL, 105; MESW, 70; PNL, 8; MSCL, 35; SCTL, 35; PDL, 22; PETL, 42; FWL, 290; FWW, 43; FFL, 82; HWL, 200; HWW, 7; HFL, 50; FFm, 80; FTb, 85; FTrs, 100; FBtrs, 40; MFm, 80; MTb, 95; MTrs, 110; HFm, 95; HTb, 105; HTrs, 110; HBstr, 55; METL, 108; OVL, 103; Ext. OVL, 10.

Male. Similar to female except general body colour darker than female. Antennal segments progressively darker from light brown to brown. Scape and pedicel yellow. Fore wing wider than female about 5.94–5.98x as long as broad. Legs almost white except mesocoxa pale yellow and last tarsal segments black.

Material Examined: INDIA: KARNATAKA: Bangalore: Nandi Hills, 1 Female (on slide), 11.iii.2010, Coll. F. R. Khan.

Hosts. Unknown from India. [Elsewhere reported from *Sophonia* species: *S. rufofascia, S. pallid* and *S. furcilinea* (Hemiptera: Cicadellidae)] (Noyes, 2015)

Distribution. India: Karnataka **(Present record),** Uttar Pradesh.

Comments. *It is new record from the Indian state of Karnataka. This species is close to P. bagicha* in having almost similar apical infuscated band differ by U-shaped and straight medial margin.

3. ***Palaeoneura bagicha*** (Narayanan, Subba Rao & Kaur)

(Figures 279–284)

Polynema bagicha Narayanan, Subba Rao & Kaur, 1960: 886, original description. Narayanan, Subba Rao & Hayat, 1961: 667, additional descriptive features.

Acmopolynenma bagicha; Mani, 1989: 1411, redescription. Subba Rao & Hayat, 1983: 131, checklist, transfer to *Acmopolynema*. Fidalgo, 1989: 6 (reasons for removing *C. bagicha* from *Acmopolynema*).

Chetomymar bagicha; Hayat, 1992: 85 (transferred from *Polynema* to *Chetomymar*).

Mymarilla deccana Mani & Saraswat, 1973: 109, original description.

Polenema deccana; Subba Rao, 1976: 89 (transferred to *Polynema*). Synonymized by Subba Rao & Hayat, 1983: 131.

Palaeoneura bagicha (Narayanan, Subba Rao & Kaur): Manickavasagam *et al.*, 2011: key. Anis & Rehmat, 2013: 6, checklist. Manickavasagam & Rameshkumar, 2013: 566, checklist.

Diagnosis

Female. Body length, 0.66–0.70 mm. Head (Fig. 279). Mandibles 3-dentate. Vertex smooth with 36 short and thick setae; face below torulus with 19+19 setae short and pointed setae. Antenna (Fig. 279) with scape and redicle about 3x as long as wide; pedicel longer than F1, F2 longest, F3 slightly shorter than F2, F4 subequal to F6; F6 with one longitudinal sensillum; clava with 7 longitudinal sensilla. Mesosoma (Fig. 282) pronotum divided mediolongitudinally with 9+9 setae; notauli with 1+1 short setae, mesoscutum longer than scutellum; axillar setae as long as scutellum length, scutellar placoid sensilla close to each other and close towards posterior margin. Propodeum with short carinae and 1+1 long setae reaching beyond posterior margin. Fore wing (Fig. 281), about 7.5x as long as wide; marginal vein elongated, with 2 short dorsal macrochetae. Longest marginal fringe about 1.5x as long as wing width. Metasoma (Fig. 283) with petiole about 5.5 x as long as wide, ovipositor slightly exserted beyond gaster apex. Ovipositor length and hind tibia ratio is 0.9: 1.

Colour. Body yellow except apex of ovipositor, apical quarter of hind femur and last tarsal segment of legs dark brown to brown. Fore wing with 1 basal infuscated band and one spot much wider along anterior than posterior margin with medial area mainly hyaline; basal margin of the apical spot strongly concave. Hind wing with apical margin dark brown. Antenna yellow except clava dark brown.

Relative measurements (slide): FVW, 55; EH, 40; POL, 22; DBT, 31; SCL, 30; SCW, 10; PL, 20; PW, 9; CLL, 60; CLW, 16; F1L, 30; F1W, 3; F2L, 52; F2W, 4; F3L, 50; F3W, 4; F4L, 38; F4W, 5; F5L, 25; F5W, 6; F6L, 25; F6W, 7; MESL, 100; MESW, 80; PNL, 14; MSCL, 40; SCTL, 32; PDL, 25; PETL, 55; PETW, 10; FWL, 310; FWW, 40; FFL, 60; HWL, 250; HWW, 6; HFL, 55; FFm, 85; FTb, 90; FTrs, 120; FBtrs, 50; MFm, 95; MTb, 120; MTrs, 130; MBstr, 60; HFm, 98; HTb, 123; HTrs, 120; HBstr, 60; METL, 125; OVL, 108; Ext. OVL, 15.

Male. Similar to female except general body colour darker than female. Antenna as in fig. 280. F3-F11 progressively darker. Fore wing about 5.67–5.96x as long as wide. Genitalia (Fig. 284) with adaegous bent ventrally at a right angle at about its mid point.

Material Examined: *INDIA:* KARNATAKA, Bangalore: Travere Kiti, 1Female & 1Male (on slide), 14.iii.2010, Coll. F. R. Khan; Nandi Hills, 2Females (on slides), 11.iii.2010, Coll. F. R. Khan; WEST BENGAL, Coach behar: Mohish batan, 1 Female (on slide), 26.v.2008, Coll. F.R. Khan.

Hosts. Unknown.

Distribution. INDIA: Delhi, Himachal Pradesh, Karnataka **(present record)**, Maharashtra, Punjab, Tamil Nadu, Uttar Pradesh, West Bengal **(present record)**. (Bangladesh, Hawaii, Sri Lanka)

Comments. It is new record from the Indian states of Karnataka and West Bengal. This species is distributed mostly in Oriental region and appears very close to *P. sophoniae* as the both species wing infuscation pattern resembles each other differ by number of setae present on head, pronotum and fore wing apical infuscated band strongly concave.

4. *Palaeoneura indopeninsularis* (Mani & Saraswat)

(Figures 285–289)

Palaeoneura indopeninsularis (Mani & Saraswat, 1973): Triapitsyn & Berezovskiy, 2007: 40. (*Polynema* from *Chetomymar* comb. nov.)

Polynema indopeninsularis; Mani & Saraswat, 1973: 119, Original description; Synonymized by Subba Rao & Hayat, 1983: 131.

Palaeoneura indopeninsularis (Mani & Saraswat): Manickavasagam *et al.*, 2011: key. Anis & Rehmat, 2013: 6, checklist. Manickavasagam & Rameshkumar, 2013: 566, 567, checklist.

Diagnosis.

Female. Body length, 0.69 mm. Head (Fig. 285) with mandibles tridentate. Vertex smooth with 36 short and thick setae; face below torulus with 19+19 setae short and pointed setae. Antenna (Fig. 286) with scape and redicle about 3x as long as wide; pedicel longer than F1, F2 longest, F3 slightly shorter than F2, F4 subequal to F6; F6 with one longitudinal sensillum; clava with 7 longitudinal sensilla. Pronotum divided mediolongitudinally with 9+9 setae; notauli with 1+1 short setae, mesoscutum longer than scutellum; axillar setae (Fig. 288) as long as scutellum length, scutellar placoid sensilla close to each other and close towards posterior margin. Propodeum with short carinae and 1+1 long setae reaching beyond posterior margin. Fore wing (Fig. 287), about 7.5x as long as wide; marginal vein elongated, with 2 short dorsal macrochetae. Longest marginal fringe about 1.5x as long as wing width. Ovipositor slightly exserted beyond gaster apex. Ovipositor length and hind tibia ratio is 0.9: 1.

Colour. Body yellow except apex of ovipositor, apical quarter of hind femur and last tarsal segment of legs dark brown to brown. Fore wing with 1 basal infuscated band and one spot much wider along anterior than posterior margin with medial area mainly hyaline; basal margin of the apical spot strongly concave. Hind wing with apical margin dark brown. Antenna yellow except clava dark brown.

Male. Similar to female except general body colour darker than female. Antenna 13-segmented.

Material Examined: INDIA: UTTAR PRADESH, Aligarh, Department of Zoology, 1Female (on slide), 05.viii.2009, Coll. T. Rehmat.

Hosts. Unknown.

Distribution. India: Andaman and Nicobar Islands, Karnataka, Kerala, Uttarakhand **(present record)**, Uttar Pradesh **(present record).**

Comments. It is new record from the Indian states of Uttarakhand and Uttar Pradesh. This species is close to *P. bagicha* by body colour and number of setae on head, but differ only by size & darker band than *P. bagicha.*

10. Genus *Polynema* Haliday

(Figures 290–358)

Polynema Haliday, 1833: 347. Type species *Polynema flavipes* Walker, by subsequent designation Huber & Bouček, 2001: 281.

Eutriche Nees, 1834: 186. Type species *Eutriche gracilis* Nees, 1834, by monotypy. Synonymized by Walker, 1846: 52.

Cosmocoma Foerster, 1856: 117, 120 (unnecessary new name).

Maidliella Soyka, 1946: 178. Type species *Maidliella neofuscipes* Soyka, 1946, by original designation. Synonymized by Annecke & Doutt, 1961: 36.

Novickyella Soyka, 1946: 179. Type species *Novickyella gracilior* Soyka, 1946, by original designation. Synonymized by Soyka, 1956: 32.

Tarphypolynema Ogloblin, 1960: 79 (as a subgenus of *Barypolynema*). Type species *Anagrus saga* Girault, 1911, by original designation. Synonimized by Triapitsyn & Fidalgo, 2006: 60.

Dorypolynema Hayat & Anis, 1999c: 318. Type species *Polynema mendeli* Girault, by original designation. Subgenus of *Polynema*.

Restisoma Yoshimoto, 1990: 68. Type species *Restisoma howdeni* Yoshimoto, by original designation. Synonymy by Triapitsyn & Fidalgo, 2006: 57.

Formicomymar Yoshimoto, 1990: 80. Type species *Formicomymar venezuelaensis* Yoshimoto, by original designation. Synonymized by Triapitsyn & Fidalgo, 2006: 57.

Polynema Haliday: Hayat & Anis, 1999c: 315–331, diagnosis, key to species; revision; notes on type material. Lin *et al.*, 2007:13, 17, cited in catalogue; classification; catalogue/checklist; diagnosis, key, cited in; key to genera; Review. New, 1976: 1–65, key to species; notes on type material. Triapitsyn & Aquino, 2008: 60, cited in catalogue; diagnosis, figures, adult, key, cited in; Key to species; (Re) description, female, taxonomy; notes on type

material. Triapitsyn & Aquino, 2010: 62, diagnosis; key to species; notes on type material.

References. Schauff, 1984: 1–67, review of Holoarctic species. Lin *et al.*, 2007:13, 17, cited in catalogue, classification, catalogue/checklist, diagnosis (Taxonomic); key, cited in, key to genera, review. Triapitsyn & Aquino, 2010: 62, diagnosis; key to species; notes on type material.

Diagnosis

Female. Body length, 0.62–1.8 mm. Face (Figs 312 & 290) with or without pit next to each torulus. Mandibles tridentate. Scape (Figs 326 & 333) with cross ridges on inner surface or smooth. Female funicle 6-segnented, all segments more or less cylindrical, longitudinal sensillum usually absent or present only on F6; clava entire, usually with 7–9 longitudinal sensilla (Figs 313, 332 & 334). Propleura mostly not abutting each other anteriorly along midline but often abutting each other along midline (Figs 302 & 329), the prosternum thus open or closed anteriorly. Neck of pronotum mostly divided and sometimes undivided mediolongitudinally. Pronotum, mesoscutum and scutellum sometimes with inconspicuous, mostly cellulate sculpture. Mesoscutum with distinct notauli; axillar seta of different length, sometime blunt; scutellar sensilla usually closer to the anterior margin of scutellum; scutellum with or without frenal foveae. Propodeum (Figs 301, 328, 339 & 346) with complete to partial to at least an incomplete medial carina (present at posterior margin of propodeum only). Fore wing (Figs 300, 315, 327, 344 & 350) disc usually broder, often narrow just beyond apex of venation than at marginal vein. Fore wing with marginal vein punctiform, usually with one or two (distal) dorsal macrochaeta and one short ventral seta at apex. Hind wing (Figs 294, 309 & 338) narrow, typical of the *Polynema*-group of genera. Tarsi 4-segmented. Metasoma with petiole much longer than wide, cylindrical, attached posteriorly to gastral tergum; ovipositor length variable (from slightly exserted to considerably much exserted.

Colour. General body colour variable, from yellow to black, usually light brown to dark brown. Colour of antennal segments variable, from light brown to dark brown. Legs usually somewhat lighter than body.

Male. Flagellum 11-segmented; genitalia elongate usually straight and long.

Hosts. Unknown from India. Elsewhere reported from Cicadellidae, Lestidae, Membracidae, Miridae and Nabidae.

Distribution. Cosmopolitan.

Species. World, 231 species (Noyes, 2015); India, 15 species, including 4 new species in present work.

Comments. Genus *Polynema* distinguished by other genera of the group on the basis of fore wing usually wider just beyond apex of venation than at marginal vein; propodeum with at least an incomplete to complete median carinae. Previously Indian species of genus *Polynema* belongs to two subgenera, *Polynema* and *Dorypolynema* but recently species of subgenera *Doriclytus* also added to this genus by Triapitsyn, 2013.

Key to Indian subgenera and species of genus *Polynema* Haliday (females and males)

1. Females: Antenna clavate, 9-segmented (1161) (Fig. 306) 2

-. Males: Antenna filiform, without a differentiated clava, 13- segmented (Fig. 335) 13

2. Head with one or two pits adajacent to toruli, propleura abutting each other anteriorly along midline (Fig. 290) ..... Subgenus *Doriclytus* 3

-. Head with out pits to each toruli; propleura not abutting each other anteriorly along midline (Fig. 312) 7

3. Head with only one pit adjacent to each toruli (Fig. 305); propodeal carinae complete (Fig. 310) 4

-. Head with two small pits adjacent to each toruli (Hayat & Singh, 2001; Fig. 2); propodeal carinae touching the anterior margin .... 1. *P.* (*D.*) *assamense* Hayat & Singh

4. Clava subequal to preceding three segments; fore wing 4x as long as broad (Mani & Saraswat, Fig. 22) ..... 2. *P.* (*D.*) *dhenkunda* Mani & Saraswat

-. Clava much shorter or longer than preceding three segments, fore wing 2.7–3.1x as long as broad (Fig. 203) 5

5. Scape without cross ridges (Fig. 313), petiole longer than metacoxa 6

-. Scape without cross ridges (Fig. 290), petiole subequal to metacoxa ..... 3. *P. (D.) alalata* sp. nov.

6. F2 longest, F4 and F6; F1 and F5subequal in length; F3 about 0.75x of F2, clava 3.3x as long as broad (Fig. 298); metasoma 0.93x as long as mesosoma length; fore wing with infusion on both anterior and posterior margin of wing base behind venation (Fig. 299); ovipositor slightly exserted and exserted part 0.03x as long as total metasoma length (Fig. 303) .... 4. *P. (D.) bicolorigastra* sp. nov.

-. F2 exactly equal to F3; F5 and F6 almost subequal in length, clava 4.1x as long as broad (Fig. 306); metasoma 1.04x as long as mesosoma length, fore wing hyaline (Fig. 308); ovipositor moderately exserted and exserted part 0.1x of total metasoma length (Fig. 311) .... 5. *P. (D.) dunense* Hayat & Anis

7. Ovipositor strongly exserted, exserted part nearly as long as gaster (Fig. 319); marginal plus stigmal veins relatively thin and long, discal setae originate distad of venation, the area behind and adjacent to veins bare (Fig. 315) .....Subgenus *Dorypolynema*

F4–F6 almost equal on length, F1–F5 without longitudinal sensilla, F6 with 1 longitudinal sensillum; clava about 3.3x as long as broad much shorter than combined segments F4–F6 with 7 longitudinal sensilla enlarged (Fig. 313), ratio of pronotum width to its median length about 2.5:1 ..... 6. *P. (D.) mendeli* Girault

-. Ovipositor either not exserted or the exserted part not more than 0.25x of length of gaster (Fig. 330); venation normal for the genus, short; discal setae originate at least from behind distal end of marginal plus stigmal veins, but more usually from behind proximal end of marginal vein (Fig. 327) .... Subgenus *Polynema s. str*..... 8

8. All coxae and at least part of femora and tibiae brown to dark brown 9

-. Legs, including coxa, pale yellow to orange yellow and at most with very light brownish suffusions 10

9. FI less than 0.5x of F2 (6:17) and distinctly shorter than F5 (6:8.5); fore wing nearly 4x as long as broad with marginal fringe 0.85x of wing width (Fig. 327) .....7.*P. (P.) manaliense* Hayat & Anis

-. FI slightly more than 0.5x of F2 (3.5:6.0) and slightly shorter than F5 (3.5:4.0); fore wing about 3x as long as broad with marginal fringe nearly 0.5x of wing width (Narayanan, 1961; Fig. 11) .... 8. *P. (P.) anantanagana* Narayanan

10. Scape with transverse striations (Fig. 333) .... 9. *P. (P.) brevicarinae* Annecke & Doutt

-. Scape without transverse striations (Fig. 343) 11

11. Clava 3x as long as broad (Fig. 349); foretibia with 5–8 conical sensilla 12

-. Clava 2.4x as long as long as broad (Fig. 343); foretibia with 10–12 conical sensilla ..... 10. *P. (P.) kamathi* Mani & Saraswat

12. Fore wing hyaline (Fig. 350); ovipositor strongly exserted, 3.2x as long as total ovipositor length (Fig. 353) and presence of 7–8 conical sensilla on fore tibia ..... 11. *P. (P.) hayati* sp. nov.

-. Fore wing disc slightly infuscate (Fig. 356); ovipositor slightly exserted, 0.07x as long as total ovipositor length (Fig. 358); presence of 5 conical sensilla on fore tibia ..... 12. *P. (P.) bengalense* sp. nov.

13. Antennal scape (excluding radicle part) suboval, flattened and expanded beneath, about 1.75x as long as broad and bearing numerous peg-like conical sensilla on inner surface; FI about 0.5x of F2 (Fig. 322); head robust with

swollen temples and cheeks and very small eyes (Fig. 321); petiole distinctly expanded in basal half (Fig. 324) ..... 6. *P. (D.) mendeli* Girault

-. All the above characters different ..... Subgenus *Polynema* s.str....14

14. Scape with transverse striations on inner surface (Mani *et al.*, 1973; Fig. 69D) 15

-. Scape either without transverse striations or with fine longitudinal striations (Mani *et al.*, 1973; Fig. 75D) 16

15. FI not shorter than F2, and flagellar segments each at least slightly less than 2x as long as broad (Mani *et al.*, 1973; Fig. 69D) .... 13. *P. (P.) anamalaiense* Mani & Saraswat

-. FI at least slightly shorter than F2, and flagellar segments each clearly longer than 2x of width (Fig. 335) ..... 9. *P. (P.) brevicarinae* Annecke & Doutt

16. Scape short, clearly less than 2x as long as broad; FI not more than 2x as long as pedicel; Fl-9 subequal in length, each at most 3x as long as broad Mani *et al.*, 1973; (Fig. 75D) 17

-. Scape longer, nearly 2.7x as long as broad; FI 2.5x as long as pedicel; Fl–5 each at least about 4x as long as broad, the segments gradually but conspicuously decreasing in length distad. (Legs yellowish or yellow brown) (Mani *et al.*, 1973; Fig. 72A) ..... 2. *P. (D.) dhenkunda* Mani & Saraswat

17. Legs, except tarsal segments 1-3, dark brown; fore wing broad, slightly less than 3.5x as long as broad, with marginal fringe nearly 0.75x of wing width (Mani *et al.*, 1973; Fig. A) ..... 14. *P. (P.) crassa* Mani & Saraswat

-. Legs, except tarsal segment 4 of all legs, pale yellow to brownish yellow; fore wing narrow, 5x as long as broad, with marginal fringe about 1.5x as long as wing width (Mani *et al.*, 1973; Fig. 75D) .... 15. *P. (P.) kalatopense* Mani & Saraswat

1. Subgenus *Doriclytus* Foerster

(Figures 290–311)

Doriclytus Foerster, 1847: 226–227. Type species *Doriclytus vitripennis* Foerster, 1847, by monotypy. Synonymized by Schauff, 1984: 52.

Subsequent references: Hincks, 1950. Kryger, 1950: 53-55. Annecke & Doutt, 1961: 25. Graham, 1973a: 49.

Diagnosis

Female. Head (Fig. 305) Face with a pit next to each torulus. Antenna (Figs 306 & 298) with scape usually smooth sometimes with striations on inner surface; all funicle segments (F1–F6) usually longer than wide; clave entire having 7, sometimes 8 longitudinal sensilla. Pronotum (Figs 301&310) entire or divided longitudinally; mesoscutum, axilla, scutellum and metanotum usually smooth, sometimes more or less with reticulate sculpture; scutellar sensilla apart from each other and usually in middle of the scutellum, frenal lines with or without a row of fovea; propodeum usually smooth, very rarely with transverse wrinkles, and either with a mediolongitudinal carina of various lengths, from complete to very short carina posteriorly or carina entirely absent. Marginal vein (Figs 299 & 308) of fore wing with two dorsal macrocheta; forewing (Figs 300 & 307) disc hyaline or variably infumate, more or less uniformaly setose beyond venation. Petiole attached to gastral tergum, longer than wide, usually more or less cylindrical but sometime dilated anteriorly, rarely dilated along entire length and also flattened; ovipositor (Figs 303 & 311) of various length, from very short to very long.

Male. Similar to female except male genitalia, digitus of genitalia mostly without hooks, rarely with minute, inconspicuous denticles (Triapitsyn & Fidalgo, 2006).

Distribution. Cosmopolitan.

Species. India: 4 species including 2 new species in present work.

Comments. Recently Triapitsyn (2014) proposed correct placement of two Indian species (*Polynema assamense* Hayat & Singh and *Polynema dhenkunda* Mani & Saraswat) in Subgenus *Doriclytus,* which was earlier placed in Subgenus *Polynema.*

1. ***Polynema (Doriclytus) assamense*** Hayat & Singh

Polynema assamense Hayat & Singh, 2001: 95–97, Female, India, Assam (FRID, not examined).

Polynema assamense Hayat & Singh: Anis & Rehmat, 2013: 7, checklist. Manickavasagam & Rameshkumar, 2013: 567, checklist.

Diagnosis

Female. Body length, approximately 1.00 mm. Head with about 26 setae on face between toruli and mouth margin; two small pits on each side next to each torulus (Hayat & Singh, 2001; Fig. 2); mandibles tridentate. Scape slightly longer than pedicel; F3 longer than F1 and F4–F6, clava longer than F4–F6 combined. Mesosoma with pronotum medially divided by a sulcus as in fig. 4; & Singh, 2001, with 5 white setae on each side; axillar seata sharp and small; propodeum with fine carina that does not reach anterior margin. Fore wing about 3x as long as broad, longest marginal fringe about 0.35 of wing width. Hind wing 21.1x as long as broad. Metasoma as long as mesosoma and oval in shape. Exserted ovipositor 0.07x of total ovipositor length.

Colour. Body dark brown to black except petiole pale yellow; antennal segments including distal half of scape and pedicel brownish yellow, remaining scape and clava dark brown; wings hyaline; legs: coxae, femora and tibiae brown; apices of fore femora and mid tibiae paler, yellow brown; tarsal segments 1–3 white, last segments dark brown.

Male. Unknown.

Hosts. Unknown.

Distribution. India: Assam.

Comments. The above diagnosis is based upon the original description given by Hayat & Singh (2110). *Polynema assamense* differs from other Indian species by scape broad, slightly longer than pedicel; F3 longer than F1 and F4–F6 separately, clava longer than length of three preceding segments (F4–F6); fore wing broad

about 3x as long as broad; propodeal carinae not touching the anterior margin of propodeum.

2. *Polynema (Doriclytus) dhenkunda* Mani & Saraswat

Polynema dhenkunda Mani & Saraswat, 1973: 116, Male, Female, India: Dalhousie: Dhenkund near Khajjar (USNM, not examined). Subba Rao & Hayat, 1986: 190, catalogue. Mani, 1989: 1417, description.

Polynema dhenkunda Mani & Saraswat: Anis & Rehmat, 2013: 7, checklist. Manickavasagam & Rameshkumar, 2013: 567, checklist. Triapitsyn, 2013: 39–41, new placement within the genus.

Diagnosis

Female. Body length, 1.0 mm. Mandibles tridentate; scape short and 2.7x as long as broad, pedicel about 0.5x as long as scape; F1 subequal to F4, F2 equal to scape and 2x of pedicel length; F3 equal to F6 and F5 equal to pedicel length; clava 2.60x as long as broad and slightly shorter than preceding three segments. Mesosoma with fore wing 4x as long as broad, longest marginal fringe equals to wing width. Metasoma about 0.5x of total length of mesosoma. Ovipositor slightly exserted, 1.4x as long as mid tibia length.

Colour. Body dark brown, scape and pedicel largely yellow brown, flagellum dark brown. legs yellowish, tibiae infuscate brown, tarsal segments 4 or 3 brownish. Petiole yellowish.

Male. Body length, 1.0 mm. Body dark brown to black except antennal segments brown. Wings hyaline. Last tarsal segments of all legs dark brown. Antenna 13-segmented; scape about 0.5x as long as broad; pedicel broad and 0.5x of scape; F1 subequal to F2–F3, F4–F5 subequal and little shorter than F3; F6 slightly shorter than F5; F7–F10 subequal; clava equal to F10 and 4x as long as broad; petiole 3x as long as broad.

Hosts. Unknown.

Distribution. India: Uttarakhand.

Comments. The above diagnosis is based on original description given by Mani and Saraswat (1973). It is previously placed in subgenus *P. Polynema* but Triapitsyn proposed its placement in subgenus *P. Doriclytus* by Triapitsyn, 2013. It is distinguished from other Indian species by broad fore wings and antennal segment measurements; clava slightly shorter than combined length of three preceeding funicle segments.

1. *Polynema (Doriclytus) alalata* sp. nov.

(Figure 290–296)

Description

Female. Body length, 1.01 mm.

Head (Fig. 290) with toruli at mid level of eyes, vertex smooth with 15 setae, face with a pit next to each torulus; ocelli in a very obtuse triangle. Mandible tridentate and sharp, 15 setae on each side of head below torulus. Antenna (Fig. 291) scape+radicle about 3.75x as long as pedicel, with cross ridges. Funicle 6-segmented, longitudinal sensillum present on F6; F2 longest, F1, F4–F6 subequal in length; F3 about 0.77x of F2; clava entire longer than three preceding segments, 2.8x as long as wide and with 9 longitudinal sensilla.

Mesosoma (Fig. 295) smooth, pronotum not divided medially and 0.3x shorter than mesoscutum with atleast 3 setae (long, blunt and strong) on each side along mesoscutum margin. Propleura abutting each other anteriorly along midline. Mesoscutum longer than scutellum with complete notauli; lateral lobes with 1+1 long and blunt seta; axillar seta (towards posterior border) long and weak, reaching to half the length of scutellum; scutellum without a row of frenal fovea, scutellar sensilla lies in the middle of the scutellum; metanotum strap like with one pair of sub-median setae, mesophragma not reaching to the posterior margin of propodeum; propodeum almost equal to scutellum length with complete median carinae; having one pair of setae just above the posterior margin. Fore wing (Fig. 292, 293) 2.7x as long as broad; marginal vein dark brown with two macrocheta and hypocheta not reaching to posteriot margin of wing base; longest marginal seta about 0.36x as long as wing width; disc evenly setose (setation limits below venation, not extending

beyond venation). Hind wing (Fig. 294) hyaline with 3 rows of setae in the middle of disc, longest marginal seta about 3.0x as long as wing width.

Metasoma (Fig. 296) longer than mesosoma length; petiole subequal to metacoxa length, having no lateral projections and incomplete ventral ridge seen anteriorly and attached to gastral tergum, coxae reticulated with few hairs on dorsal and ventral side. Ovipositor slightly longer than length of gaster, slightly exserted beyond apex, 0.1x of total length of ovipositor; ovipositor length and hind tibia length ratio (200:135) is 1.48:1.

Colour. Head and body dark brown except, scape and pedicel light brown except distal dark brown. Axilla with dark brown border. Fore wing hyaline with dark infuscation just below venation towards basal attachment. Hind wing hyaline. Legs dark brown except procoxa, protrochanter, profemur and basal tarsal segments light brown, basal three tarsal segments light brown. Petiole light brown; ovipositor sheath dark brown.

Relative measurements (slide): HL, 85; FVW, 65; DBT, 34; EH, 55; POL, 38; SCL, 75; PL, 20; CLL, 74; CLW, 26; F1L, 20; F1W, 6; F2L, 35; F2W, 6; F3L, 27; F3W, 6; F4L, 20; F4W, 8; F5L, 20; F5W, 10; F6L, 23; F6W, 10; MESL, 140; PNL, 15; PNW, 80; MSCL, 50; MSCW, 90; SCTL, 36; SCTW, 50; Meso.PL, 32; PDL, 32; FFL, 90; FWL, 404; FWW, 150; FFL, 55; HWL, 320; HWW, 18; HFL, 55; FTb, 80; FTrs,100; FBstr, 40; MTb, 108; MTrs, 110; MBstr, 55; HCL, 40; HFm, 90; HTb, 135; HTrs, 190; HBstr, 60; METL, 190; PETL, 46; OVL, 200; Ext. OVL, 20.

Male. Unknown.

Material examined. *Holotype* Female (on slide, under 4 coverslips); INDIA: UTTARAKHAND, Ranikhet, Chaubatia, 27.x.2009, Coll. F.R. Khan.

Hosts. Unknown.

Distribution. India: Uttarakhand.

Etymology. Species name derived from the broad wings of the holotype (Latin:ala= wing; latus= wide).

Comments. *P. (D.) alalata* sp. nov. is closely related to *Polynema (D.) assamense* Hayat & Singh, by broad fore wing and discal setation, hypocheta short not reaching to posterior margin of fore wing and clava longer than F4–F6 combined but differ by face with a single pit near each torulus; scape much longer, than pedicel; F2 longest, F1, F4–F6 subequal in length; F3 about 0.77x of F2; exserted ovipositor, 0.1x as long as total length of ovipositor (In *P. (D.) assamense*: face with two small pits adjacent to each torulus; scape slightly longer than pedicel; F3 longer than F1 and F4–F6; exserted ovipositor, 0.07x as long as total length of ovipositor).

2. *Polynema (Doriclytus) bicolorigastra* sp. nov.

(Figures 297–298)

Description

Female. Body length, 1.18 mm.

Head (Fig. 297) with toruli below mid level of eyes, vertex smooth, face with a pit next to each torulus; ocelli in a very obtuse triangle. Mandible tridentate and sharp, 12 setae on each side of head below torulus. Antenna (Fig. 298) scape with radicle about 1.76x as long as pedicel, without any cross ridges. Funicle 6-segmented, longitudinal sensillum present on F6; F2 longest, F4 and F6; F1 and F5subequal in length; F3 about 0.75x of F2; clava entire about 3.3x as long as broad, much shorter than three preceding segments and with 8 longitudinal sensilla.

Mesosoma (Fig. 301) smooth, pronotum not divided medially and about 0.44x shorter than mesoscutum with atleast 3 setae (long and strong) on each side along mesoscutum margin. Propleura abutting each other anteriorly along midline as in fig. 302. Mesoscutum longer than scutellum with complete notauli; lateral lobes with 1+1 long and blunt seta, axillar seta (towards posterior border) long and weak, reaching to half the length of posterior scutellum; scutellum with a row of frenal fovea, scutellar sensilla lies slightly towards posterior margin; metanotum strap like with 1 pair of sub-median setae, mesophragma not reaching to the posterior margin of propodeum; propodeum almost equal to scutellum length with complete median carinae; having one pair of long and strong setae just above the posterior margin reching half length of meta coxae. Fore wing (Figs 299, 300) 3.18x as long as wide;

marginal vein dark brown; longest marginal seta about 0.30x as long as wing width; blade thickly and evenly setose. Hind wing hyaline with 2 rows of setae in the middle of disc, 37.5x as long as broad; longest marginal fringe about 5.5x as long as wing width.

Gaster (Fig. 303) almost subequal in length to gaster; petiole longer than metaxocxa, having lateral projections anteriorly and attached to gastral tergum, coxae smooth with few hairs on ventral side. Ovipositor smaller than total length of gaster, a little exserted beyond apex (about 0.05x of total length of ovipositor), 0.9x as long as mid tibia length; ovipositor length: meta tibia length (140:180) = 0.7:1.

Colour. Head and body dark brown except scape and pedicel light brown, Axilla dark brown border. Fore wing with dark infusion on both anterior and posterior margin of wing base behind venation and below venation. Legs dark brown except procoxa, protrochanter, profemur and basal tarsal segments light brown. Apical gastral terga light brown and middle terga slightly darker than other; petiole dark brown; ovipositor sheath dark brown as in fig. 304.

Relative measurements (slide): HL, 90; FVW, 75; TMMD, 30; DBT, 36; EH, 45; POL, 43; SCL, 44; SCW, 13; PDL, 25; CLL, 76; CLW, 23; F1L, 28; F1W, 6; F2L, 50; F2W, 9; F3L, 40; F3W, 7; F4L, 30; F4W, 9; F5L, 24; F5W, 10; F6L, 30; F6W, 11; MESL, 177; PNL, 25; PNW, 70; MSCL, 56; MSCW, 95, SCTL, 40; SCTW, 47, Meso.PL, 42; PDL, 35; FWL, 525; FWW, 165; FFL, 50; HWL, 375; HWW, 10; HFL, 55; FFm, 100; FTb, 95; FTrs, 130; FBstr, 48; MFm, 100; MTb, 145; MTrs, 135; MBstr, 60; MTCL, 50; HFm, 100; HTb, 180; HTrs, 155; HBstr, 65; METL, 185; PETL, 70; OVL, 140; Ext. OVL, 7.

Male. Unknown.

Material examined. *Holotype* Female (on slide, under 4 coverslips); INDIA: WEST BENGAL, Gorabari, 15.vi.2008, Coll. F.R. Khan.

Hosts. Unknown.

Distribution. India: West Bengal.

Etymology. Holotype named after the colour pattern of metasoma (two colours metasoma).

Comments. This species is very closely related to *Polynema (D.) dunense* Hayat & Anis (1999c) species by having scape without any cross ridges, pronotum undivided, long petiole, scutellum with a row of frenal fovea; fore wing setation but differ by F2 longest, F4 and F6; F1 and F5subequal in length; F3 about 0.75x of F2, clava 3.3x as long as broad; metasoma 0.93x as long as mesosoma length; fore wing with infusion on both anterior and posterior margin of wing base behind venation; ovipositor slightly exserted and exserted part 0.03x as long as total metasoma length. [In *P. (D.) dunense:* F2 exactly equal to F3; F5 and F6 almost subequal in length, clava 4.1x as long as broad; metasoma 1.04x as long as mesosoma length, fore wing hyaline; ovipositor moderately exserted and exserted part 0.1x of total metasoma length].

3. *Polynema (Doriclytus) dunense* Hayat & Anis

(Figures 305–311)

Polynema dunense Hayat & Anis, 1999c: 319–328, Female, India, Uttar Pradesh, Dehra dun (BMNH, not examined); Anis & Rehmat, 2013: 7, checklist. Manickavasagam & Rameshkumar, 2013: 567, checklist.

Redescription

Female. Head (Fig. 305) with toruli above mid level of eyes, vertex smooth, face with a pit next to each torulus; 21 setae on each side of head below torulus; ocelli in a very obtuse triangle. Mandibles tridentate. Antenna (Fig. 306). Scape about 1.4x as long as pedicel, without any cross ridges; female funicle 6-segmented, longitudinal sensillum present on F6; F2 exactly equal to F3; F5 and F6 almost subequal in length; clava entire, longer than three preceding funicle segments and 4.1x as long as wide with 9 longitudinal sensilla.

Mesosoma (Fig. 310) smooth, pronotum entire, about 2.7x shorter than mesoscutum, with at least 5 pairs of strong and blunt setae. Mesoscutum longer than scutellum with complete notauli; lateral lobes of mesoscutum with 1+1 strong and blunt seta; axillar seta weak and blunt, reaching to half length of posterior scutellum. Propleura

abutting each other anteriorly along midline. Scutellum with arrow of frenal fovea, scutellar sensilla in the middle of scutellum; metanotum strap like with one pair of submedian setae, mesophragma not reaching to the posterior margin of propodeum; propodeum almost equal to scutellum length with complete median carinae, having one pair of long setae just above the posterior margin. Fore wing (Figs 307, 308) 3.1x as long as wide; marginal vein with 2 dorsal macrocheta; longest marginal seta about 0.3x as long as width of the wing; blade thick and evenly setose. Hind wing (Fig. 309) hyaline with 2 rows of setae in the middle of disc; about 4x as long as greatest wing width.

Metasoma (Fig. 311) shorter than mesosoma; petiole longer than the metacoxa length, having lateral projections close towards anterior attachment; petiole attached to gastral tergum; coxae smooth. Ovipositor subequal in length of gaster, a little exserted beyond apex (about 0.1x of the total length of ovipositor); ovipositor and hind tibia length ratio is 137:150 is 0.9:1.

Colour. Head and antenna light brown except notauli, trabeculae and clava dark brown. Mesosoma, metasoma and appendages light brown except notauli borders of posterior scutellum brown. Fore wing hyaline with slight infuscation behind venation. Submedial part of posterior gaster and last tarsal segments dark brown.

Relative measurements (slide): FVW, 80; DBT, 36; EH, 56; TMMD, 37; SCL, 35; SCW, 16; PL, 25; PW, 13; CLL, 88; CLW, 21; F1L, 18; F1W, 6; F2L, 43; F2W, 6; F3L, 43; F3W, 7; F4L, 33; F5W, 9; F5L, 25; F5W, 9; F6L, 24; F6W, 11; MESL, 144; MSCL, 50; MSCW 80; SCTL, 35; SCTW, 42; Meso.PL, 37; PDL, 30; FWL, 430; FWW, 135; FFL, 42; HWL, 340; HWW, 11; HFL, 45; FFm, 85; FTb, 95; FTrs, 120; FBstr, 46; MFm, 95; MTb, 135; MTrs, 110; MTCL, 45; HFm, 100; HTb, 150; METL, 135; METW, 80; PETL, 65; OVL, 137; Ext.OVL, 16.

Male. Unknown.

Material examined. INDIA: SIKKIM, Gangtok, Daragaon, 2Females (on slides), 02.vi.2008, Coll. F.R. Khan.

Hosts. Unknown.

Distribution. India: Sikkim **(present record)**, Uttarakhand.

Comments: It is new record from the Indian state of Sikkim. This species described by Hayat & Anis, 1999c as new species from Dehra dun (previously comes under Uttar Pradesh), now comes under State Uttarakhand. It differ from other Indian species on the basis of complete median carinae on propodeum and mediolongitudinally undivided pronotum. In present work *Polynema dunense* placed under Subgenus *Doriclytus* on the basis of original description and some characters as follows: complete median carinae on propodeum and mediolongitudinally undivided pronotum, though presence of pits next to each torulus and propleura abutting each other anteriorly along midline, not described by Hayat & Anis (1999c).

2. Subgenus *Dorypolynema* Hayat & Anis

(Figures 312–324)

Polynema (Dorypolynema) Hayat & Anis, 1999c: Type species *Polynema mendeli* Girault, 1913, by original designation.

Polynema (*Dorypolynema*): Triapitsyn & Fidalgo, 2006: 57–60, key to subgenera of *Polynema*, distribution, comments. Triapitsyn & Berezovskiy, 2007: 63, key to Australian *Polynema* group genera.

Diagnosis

Female. Face (Fig. 312) without a pit next to each torulus; propleura not abutting anteriorly, thus open anteriorly. Pronotum wider than long, row of freanal foveae present on scutellum, propodeum with posterior elevation medially; petiole notably expanded anteriorly. For wing (Figs 314, 315, 316 & 317) disc bare just beyond veination.

Male. Similar to female except, head and mandible larger than in female (swollen cheeks and temples (Fig. 321); eye somewhat reduced and smaller than in female; scape with modified conical setae on inner surface, petiole expanded in anterior half as in fig. 322& 323.

Distribution. Subgenus *Dorypolynema* contains 2 species *D. mendeli* Girault, 1913 and *D. gaucho* Triapitsyn & Aquino, 2010 from Argentina, Brazil, Costa Rica, Ecuador and Peru.

Species. Only one species from India.

Comments. It is very much close to *P. (Polynema)* but differ by having petiole varying in shape, usually more or less cylindrical and fore wing disc beyond veination bare. Hayat & Anis (1999c) described *P. mendeli* Girault, from India as type species of sub genus *P. (Dorypolynema).*

1. *Polynema (Dorypolynema) mendeli* Girault

(Figures 312–324)

Polynema mendeli Girault, 1913: 219. Male, Australia: Queensland (QMB), not examined. Subba Rao & Hayat, 1983; 139, catalogue.

Polynema (Doripolynema) mendeli Girault, 1913: Triapitsyn & Aquino, 2010: 61–77. Anis & Rehmat, 2013: 7, checklist. Manickavasagam & Rameshkumar, 2013: 567, checklist.

Diagnosis

Female. Body length, 0.98 mm. Head (Fig. 312). 18 +18 setae on face, genae swollen. Antenna (Fig. 313). Scape with radical about 3.3x as long as wide and smooth; pedicel longer than F1, F2 longest but longer than F3. F3 much longer than other preceding segments, F4–F6 almost equal on length, F1–F5 without longitudinal sensillum, F6 with one longitudinal sensillum; clava about 3.3x as long as broad much shorter than combined segments F4–F6 with 7 longitudinal sensilla.

Mesosoma (Fig. 318) with pronotum about half of scutellum length; mesoscutum with transverse reticulations; scutellum smooth and smaller than mesoscutum (40:50); placoid sensilla of scutellum about slightly anterior in position and a row of frenal fovea; propodeum with conspicuous lateral carinae reaching to half of the propodeum length towards anterior margin. Forewing (Fig. 315) 5.4x as long as wide; marginal vein elongate, with 2 dorsal macrocheta; disc almost hyaline, disc bare behind marginal vein; densely setose beyond venation; the longest marginal

fringe about 1.1x as long as width of wing disc. Hind wing about 48x as long as wide and almost hyaline with a row of setae along anterior margin and discontinuous row along posterior marginal; longest marginal fringe about 7.25x as long as wing width.

Metasoma (Fig. 319) petiole 2.6x as long as wide approximately. Ovipositor occupying almost entire length of gaster (Fig. 319), strongly exserted ovipositor about 0.4x of its own length (395:185); ovipositor length to hind tibia length ratio is 395:130= 3.03 :1.

Colour. Body dark brown. Petiole, anterior and posterior part of gaster light brown. Legs with femur and tibiae yellowish or light brown, last tarsal segments dark brown.

Relative measurements (slide from Assam): HL, 70; DBT, 30; EH, 50; POL, 37: TMMD, 25; MESL, 160; MSCL, 50; SCTL, 40; PDL, 40; FWL, 480; FWW, 88; FFL, 75; HWL, 385; HWW, 8; HFL, 58; FFm, 90; FTb, 85; FTrs, 105; MTb, 130; MTrs, 130; PETL, 40; PETW, 15; METL, 205; OVL, 395; Ext.OVL, 185.

Relative measurements (slide from Kerala): HL, 70; DBT, 30; EH, 50; POL, 34: TMMD, 26; MESL, 145; MSCL, 48; SCTL, 40; PDL, 33; FWL, 450; FWW, 88; FFL, 75; HWL, 350; HWW, 8; HFL, 50; FFm, 80; FTb, 85; FTrs, 105; MTb, 140; MTrs, 120; PETL, 40; PETW, 45; METL, 200; OVL, 360; Ext.OVL, 210.

Male. Similar to female except for the normal sexual dimorphic features. Head (Fig. 321) hypercephalous large with reduced eyes; antennal scape (Fig. 323) flattened and expanded beneath, with numerous peg-like conical sensilla on inner surface; petiole expanded in anterior half.

Material examined: INDIA: ASSAM: Guwahati, Kontola, 1Female (on slide), 28.x.2008, Coll. F.R. Khan; KERALA: Malappuram, Talakere, 1Female (on slide), 8.i.2012, Coll. F.R. Khan.

Additional material examined: INDIA: ASSAM, Haflong, 1Male & 1Female (on slides), 10.viii.1987, Coll. S. Singh (determined by M. Hayat as *Polynema mendeli*).

Hosts. Unknown.

Distribution: India: Andaman and Nichobar Island, Assam, Bihar, Jharkhand, Karnataka, Kerala, Odisha, Puducherry, Tamil Nadu, West Bengal (Malaysia, Australia).

Comments. Subba Rao (1989) described *Polynema narendrani* from Kerala and later Hayat & Anis (1999c) synonymized it under *P. (Dorypolynema) mendeli.* It differs from the other species of the genus *P. (Dorypolynema) gaucho* Triapitsyn & Aquino, 2010 by characters as follows: pronotum enlarged, ratio of pronotum width to its median length about 2.5:1 (in *P. D. gaucho* Pronotum normal, not enlarged, ratio of pronotum width to its median length about 9:1)

3. Subgenus *Polynema* Haliday

(Figures 325–358)

Polynema Haliday, 1833: 347. Type species *Polynema flavipes* Walker, by subsequent designation Huber & Bouček, 2001: 281.

Eutriche Nees, 1834: 186. Type species *Eutriche gracilis* Nees, 1834, by monotypy. Synonymized by Walker, 1846: 52.

Cosmocoma Foerster, 1856: 117, 120 (unnecessary new name).

Maidliella Soyka, 1946: 178. Type species *Maidliella neofuscipes* Soyka, 1946, by original designation. Synonymized by Annecke & Doutt, 1961: 36.

Novickyella Soyka, 1946: 179. Type species *Novickyella gracilior* Soyka, 1946, by original designation. Synonymized by Soyka, 1956: 32.

Tarphypolynema Ogloblin, 1960: 79. Type species *Anagrus saga* Ogloblin, by original designation (As subgenus of *Barypolynema*) Synonymized by Triapitsyn & Fidalgo, 2006: 60.

Restisoma Yoshimoto, 1990: 68. Type species *Restisoma howdeni* Yoshimoto, by original designation. Synonymized by Triapitsyn & Fidalgo, 2006: 57.

Formicomymar Yoshimoto, 1990: 80. Type species *Formicomymar venezuelaensis* Yoshimoto, by original designation. Synonymyzied by Triapitsyn & Fidalgo, 2006: 57.

Subsequent references: Hincks, 1950: 177–181. Kryger, 1950: 90–92. Annecke & Doutt, 1961: 36–37. Graham, 1982: 227–230. Schauff, 1984: 52–54; Yoshimoto, 1990: 81–84. Type species *Polynema flavipes* Walker, 1846, designated by Huber & Boucek, 2001: 280–281.

Diagnosis

Female. Head (Fig. 325) with face without pit next to each torulus. Mandibles tridentate. Scape with cross ridges on inner surface or smooth. Funicle (Fig 326) 6-segnented, all segments more or less cylindrical, longitudinal sensillum usually absent on funicle segments; clava entire, usually with 7 or 8 longitudinal sensilla. Propleura (Fig. 329) not abutting each other anteriorly along midline, the prosternum thus open anteriorly, neck of pronotum divided mediolongitudinally; pronotum, mesoscutum and scutellum sometimes with inconspicuous, mostly cellulate sculpture. Mesoscutum with distinct notauli; axillar seta of different length, sometime blunt; scutellar sensilla usually closer to the anterior margin of scutellum; scutellum with or without frenal foveae. Propodeum with at least an incomplete medial carina (present at posterior margin of propodeum only). Forewing (Fig. 327) disc usually wider just beyond apex of venation than at marginal vein. Forewing with marginal vein punctiform, usually with one (the distal) dorsal macrochaeta and one short ventral seta at apex. Hind wing (Fig. 338) narrow, typical of the *Polynema*-group of genera. Tarsi 4-segmented. Petiole much longer than wide, cylindrical, attached posteriorly to gastral tergum; ovipositor length variable.

Male. (Fig. 335) Flegellum 11-segmented; genitalia elongate usually straight and long.

Hosts. Unknown from India. Elsewhere reported from Cicadellidae, Lestidae, Membracidae, Miridae and Nabidae.

Distribution. Cosmopolitan.

Species. India, 10 species including 2 new species in present work.

Comments. Subgenus *Polynema* belongs to the *Polynema* group of genera. Within these subgenera *Polynema,* pit near each torulus absent and the prosternum open

anteriorly by the propleura not meeting medially, which distinguishes *P. (Polynema)* to *P. (Dorypolynema)* and *P. (Doriclytus)*. The scutellar sensilla are almost always in the middle of scutellum in *P. (Doriclytus)* and also in the species of *P. (Dorypolynema)*, close to the anterior margin of scutellum in *P. (Polynema)*.

1. ***Polynema (Polynema) manaliense*** Hayat & Anis

(Figures 325–330)

Polynema manaliense Hayat & Anis, 1999c: 320, Female, by monotypy. India: Himachal Pradesh (BMNH, not examined).

Polynema manaliense Hayat & Anis: Anis & Rehmat, 2013: 7, checklist. Manickavasagam & Rameshkumar, 2013: 567, checklist.

Diagnosis

Female.

Head (Fig. 325). Body length, 1.0 mm. Mandibles tridentate; ocellar angle strongly obtuse; posterior ocelli nearly in line with posterior corners of the eyes, on the sloping side of the occipital region. Antenna (Fig. 326) with F1 0.4x of F2, F2 longest, F3, F5 a subequal in length; scape 1.64x as long as pedicel length and longitudinal striations on inner surface; clava with 7 longitudinal sensilla. Mesosoma (Fig. 328) 0.7x of metasomal length; pronotum medially completely divided by a longitudinal suture or sulcus; mesoscutum and scutellum almost equal in length; propodeum at most with a short median ridge at posterior end. Fore wing (Fig. 327) broad apically and evenly setose, about 4.4x as long as broad, longest marginal fringe 0.7x of wing width. Metasoma (Fig. 330) 1.4x as long as mesosoma length, petiole, 0.27x of metasoma length, exserted ovipositor 0.02x of metasoma length and 0.12x of metasoma length.

Colour. Body dark brown; petiole pale yellow to white; scape and pedicel pale yellow, funicle gradually becoming brownish distally, clava dark brown; wings hyaline, legs brownish, with distal ends of femora and bases of tibiae pale.

Relative measurements (slide): HL, 19; EH, 55; DBT, 10; POL, 8; SCL, 46; PL, 28; CLL, 58; CLW, 23; F1L, 18; F2L, 55; F3L, 32; F4L, 25; F5L, 30; F6L, 30;

MESL, 140; PNL, 18; MSCL, 48; SCTL, 50; PDL, 27; FWL, 490; FWW, 110; FFL, 83; HWL, 355; HFL, 41; MTb, 133; MBstr. 50; HTb, 146; HTrs, 155; HBstr, 62; METL, 200; PETL, 54; OVL, 200; Ext. OVL, 25.

Male. Unknown.

Material examined. INDIA: ORISSA, Khorda Harajpur; 6Females (on slides), 4.xii.2007, Coll. F.R. Khan; SIKKIM: Gangtok, Ranipul, 1Female (on slide), 4.vi.2008, Coll. F.R. Khan. WEST BENGAL, Darjeeling, Gorabari; 5 Females (on slides), 15.vi.2008, Coll. F.R. Khan.

Hosts. Unknown.

Distribution. India: Himachal Pradesh, Orissa **(present record),** West Bengal **(present record),** Sikkim **(present record).**

Comments. It is new record from Indian states of Orissa, West Bengal and Sikkim. This species is described by Hayat & Anis, 1999c and based on female. The holotype of *P. manaliense* is in the BMNH and could not be examined. Therefore the above specimen is compared with original description and figures, and found to be conspecific with *P. manaliense*.

2. *Polynema (Polynema) anantanagana* Narayanan

Polynema anantanagana Narayanan, 1961: 24. Female. India, Jammu & Kashmir [NPC (lost??), not examined]. Subba Rao & Hayat, 1983: 139, catalogue. Subba Rao & Hayat, 1986, catalogue. Mani, 1989: 1430, as species *incertae sedis*;

Polynema anantanagana Narayanan, 1961: Hayat & Anis, 1999c: 321, diagnosis. Anis & Rehmat, 2013, 7, checklist. Manickavasagam & Rameshkumar, 2013, 567, checklist.

Diagnosis

Female. F1 slightly more than 0.5x of F2 and slightly shorter than F5; fore wing about 3x as long as broad with marginal fringe nearly 0.5x of wing width.

Colour. All coxae and lower part of femora and tibiae dark brown.

Male. Unknown.

Host. *Quadraspidiotus perniciosus*, Diaspididae (Hemiptera).

Distribution. India: Jammu & Kashmir.

Comments. This species is close to *P. manaliense* Hayat & Anis (1999c), but differentiated on the basis of antennal segment and fore wing measurements of *P. manaliense*. Above diagnosis is based on Hayat & Anis (1999c) review of Indian species of *Polynema*. Further studies on this species possible, if any material found in future.

3. ***Polynema (Polynema) brevicarinae*** Annecke & Doutt

(Figures 331–341)

Polynema brevicarinae Annecke & Doutt, 1961: 60, Male, Female. Holotype Female, South Africa: Pretoria (PPRI, not examined).

Polynema (Polynema) indica Narayanan & Subba Rao, 1961: 663. Holotype Female, India: Delhi (NPC), not examined. Synonymized by Subba Rao & Hayat, 1983: 139, catalogue. Subba Rao & Hayat, 1986: 190, catalogue. Mani, 1989: 1429, description.

Polynema (Polynema) truncata Narayanan & Subba Rao, 1961: 664. Holotype Female, India: Delhi (NPC), not examined. Synonymized by Subba Rao & Hayat, 1983: 140, catalogue. Subba Rao & Hayat, 1986: 190, catalogue. Mani, 1989: 1428, description.

Polynema brevicarinae Annecke & Doutt, 1961: Hayat & Anis, 1999c: 315–331. Anis & Rehmat, 2013: 7: checklist. Manickavasagam & Rameshkumar, 2013: 567, checklist.

Polynema huberi Manickavasagam & Rameshkumar, 2012: 185–188. Female. India, Tamil Nadu (EDAU, not examined). **syn. nov. (present work)**

Diagnosis

Female. Body length, 0.7–0.97 mm. Head (Fig. 331). Dorsum transverse; vertex at the level of transverse trabecula. Mandibles tri-dentate; ocellar angle strongly

obtuse; posterior ocelli nearly in line with posterior corners of the eyes, on the sloping side of the occipital region. Antenna (Figs 332, 333, 334) with F1 0.32–1.1x as long as F2, F2 longest, F3–F6 subequal in length; scape 1.1x of pedicel length, with distinct transverse striations on inner surface; clava with 6–7 sensilla. Mesosoma (Fig. 339) 0.8x of metasomal length; pronotum medially completely divided by a longitudinal suture or sulcus; mesoscutum and scutellum almost equal in length; propodeum at most with a short median ridge at posterior end. Fore wing (Figs 336, 337) broad apically, about 3.8–4.4x as long as broad, longest marginal fringe 0.76–1.0x as long as wing width and discal setation. Metasoma (Figs 340, 341) 1.2x as long as mesosoma length, petiole, 0.1–0.3x of metasoma length; ovipositor exserted part about 0.08–0.1x of metasoma length, 0.1x of total ovipositor length .

Colour. Body dark brown to black, with petiole pale yellow to white; antennal scape and pedicel mainly yellow, funicle light brown to dark brown; F1, F2, F3 light brown F5, F6 and clava dark brown, legs light yellow brown especially on femora and tibiae, fore tarsi usually brown, last tarsal segments of mid and hind tarsi brown.

Relative measurements (slide): HW, 55; EH, 34; TMMD, 28; SCL, 32; PL, 28; FnL, 90; CLL, 45; F1L, 14; F2L, 35; F3L, 20; F4L, 18; F5L, 20; F6L 25; MESL, 115; PNL, 20; MSTL, 30; SCTL, 30; PDL, 28; FWL, 290; FWW, 65; FFL, 68; HWL, 227; HFL, 45; FTb, 62; FBstr, 30; MTb, 85; MBstr, 32; HTb, 100; HBstr, 40; METL, 140; PETL, 33; Ext.OVL, 20; OVL, 150.

Male. Similar to female except antenna (Fig. 335) with fine striations on inner surface of scape, F1 slightly shorter than F2 and each funicle segments 2x as long as broad.

Type material examined. (Paratypes of *P. huberi* Manickavasagam & Rameshkumar) INDIA: ANDHRA PRADESH: Hyderabad, 2 Females (on cards), Acharya N.G. Ranga Agricultural University premises, 12.x.2010, Coll. S. Manickavasagam and A. Rameshkumar. (Present in ZDAMU).

Material examined. INDIA:HIMACHAL PRADESH: Mandi, Behana, 1Female (on slide), 22.vi.2006, Coll. S.M.A. Badruddin & F.R. Khan. Mandi, Chandiyal,

1Female (on slide), 26.vi.2006, Coll. S.M.A. Badruddin & F.R. Khan; ORISSA: Bhubaneswar, Bariyanta, 1Female (on slide), 25.xi.2007, Coll. F.R. Khan; UTTAR PRADESH: Aligarh, Department of Chemistry, 9Females, 4Males, 30.v.2009, Coll. T. Rehmat. Aligarh, Department of Zoology, 1Female (on slide), 5.viii.2009, Coll. T. Rehmat. Firozabad, Nagla Prabhu, 1Female (on slide), 4.ix.2007, Coll. F.R. Khan. Qayamganj, Baryala, 1Female (on slide), 7.ix.2007, Coll. F.R. Khan; UTTARAKHAND: Almora, Matikhola, 1Female (on slide), 28.x.2009, Coll. F.R. Khan.

Hosts. Unknown.

Distribution. India: Andaman and Nicobar Island, Andhra Pradesh, Bihar, Delhi, Himachal Pradesh **(present record)**, Karnataka, Kerala, Maharashtra, Odisha, Puducherry, Tamil Nadu, Uttar Pradesh, Uttarakhand.

Comments. It is new record from the Indian state of Himachal Pradesh. It is a widely distributed and highly variable species of this subgenus and found almost in every habitat. Hayat & Anis (1999c) provided relative measurements of some body structures of *P. (P.) brevicarinae*, which shows high variation in measurements. This species mainly differs from other species of the subgenus on the basis of transverse striations on scape. *Polynema huberi* Manickavasagam & Rameshkumar synonymized under *Polynema brevicarinae* Annecke and Doutt in present work. The yellowish brown mesosoma is the only character on the basis of which *P. huberi* differ from *P. brevicarinae* (with brown, dark brown to black mesosoma). I have examin paratypes present in ZDAMU, and found that, all the relative measurements of this species comes under the range of *P. brevicarinae* and hence, *P. huberi* is synonymized into *P. brevicarinae*.

4. ***Polynema (Polynema) kamathi*** Mani & Saraswat

(Figures 342–347)

Polynema kamathi Mani & Saraswat, 1973: 123. Female, India: Dalhousie (USNM, not examined). Subba Rao & Hayat, 1983: 139, catalogue. Subba Rao & Hayat, 1986: 190, catalogue. Mani, 1989: 1426; description. Hayat & Anis, 1999c: 323.

Polynema kamathi Mani & Saraswat, 1973: Anis & Rehmat, 2013: 7. checklist; Manickavasagam & Rameshkumar, 2013: 567, checklist.

Diagnosis

Female. Body length, 0.95 mm. Head (Fig. 342) Mandibles tridentate. About 8 setae on vertex around ocelli and 21 + 21 setae on each side of the face between eyes and clypeus (including malar space setae). Antenna (Fig. 343) Scape longer than pedicel without transverse striations; pedicel having long setae and about 1.6x as long as wide; all funicle segments including clava thickly setose; F1 equal to F4; F2 longest, F3 subequal to F5 and slightly shorter than F6; F6 with one sensillum; clava 2.4x as long as broad, with 7 longitudinal sensilla all arrange apically. Mesosoma (Fig. 346) 1x as long as metasoma; pronotum divided mediolongitudinally with row of setae along posterior margin. Mesoscutum and axilla with reticulate cellulate sculpture, axilla with 1+1 long and strong setae covering half of the scutellum length; mesoscutum with complete notauli, scutellum smooth and slightly shorter than mesoscutum, scutellar sensilla almost in the middle and far apart from each other, frenal line with small fovea; metanotum strap like or broad. Propodeum with small carinae touches posterior margin of propodeum, one pair of long propodeal setae and spiracles present. Fore wing (Figs 345, 346) 4.1x as long as wide; venation short hypocheta just reaching to posterior margin, venation dark brown having marginal vein with two (distal) dorsal macrochetae and one short ventral seta at apex, apical part of disc hyaline, evenly and thickly setose, setation reaching towards the wing attachment. Hind wing 36.6x as long as wide with a rows of setae towards anterior margin of disc. Tarsi 4-segmented; fore tibia with 10–12 conical sensilla. Metasoma (Fig. 347) slightly longer than mesosoma length, petiole as broad as hind coxae towards anterior attachment; tergites 6; ovipositor occupying almost whole length of metasoma, 1.6x as long as mid tibia length, slightly exserted 0.07x as long as total length of ovipositor. Ovipositor and hind tibia ratio (183: 117) is 1.5.

Colour. Body dark brown to black except petiole pale yellow to white; scape and pedicel pale yellow to brown, funicle segments light brown except F1light brown to yellow; clava dark brown; wings infuscated at basal part (below and after venation), discal setae below venation becomes transparent or light in colour rest of the disc

hyaline; legs brownish, with distal ends of femora and bases of tibiae pale, last tarsal segments of all tarsi dark brown.

Relative measurements (slide). HL, 86; HW, 100; EH, 50; FVW, 65; TMMD, POL, 33, DBT, 31; SCL, 50; SCW, 18; PL, 25; PW, 15; CLL, 57; CLW, 23; F1L, 20; F1W, 5; F2L, 45; F2W, 5; F3L, 27; F3W, 5; F4L, 20; F4W, 6; F5L, 25; F5W, 7; F6L, 30; F6W, 10; MESL, 150; MSCL, 42; SCTL, 38; MTANL, 7; PDL, 35; FWL, 455; FWW, 110; HWL, 330; HWW, 9; HFL, 63; FFm, 95; FTb, 90; FTrs, 120; FBtrs, 63; MFm, 90; MTb, 117; MTrs, 130; MBstr, 50; HFm, 100; HTb, 140; HTrs, 140; HBstr, 53; METL, 175; PETL, 50; OVL, 183; Ext. OVL, 13.

Male. Unknown.

Material examined. INDIA: WEST BENGAL: Darjeeling, Gorabari, 2 Female (under 4 coverslips), 15.vi.2008, Coll. F. R. Khan.

Hosts. Unknown.

Distribution. India: Himachal Pradesh, West Bengal **(Present record)**.

Comments. It is new record from Indian state of West Bengal.The above diagnosis is based on original description and illustrations given by Mani & Saraswat (1973) and diagnosis given by Hayat and Anis (1999c). The holotype of *P. kamathi* is in the USNM and could not be examined. Therefore the above specimen is compared with original description and figures, and found to be conspecific with *P. kamathi*.

5. *Polynema (Polynema) hayati* sp. nov.

(Figures 348–353)

Description

Female. Body length (Holotype), 0.83 mm. Head (Fig. 348) folded over the dorsal side, face with subantennal grooves carrying setae, slightly above the mid level of eye; mandibles tridentate. Antenna (Fig. 349) much shorter than body, radical fuse with the scape, scape with transverse striations or ridges and about 2x as long as broad; pedicel longer than F1; F2 longest, F3 longer than following funicle segments; F4–F6 subequal in length, F5 slightly longer and wider than preceeding sements; clava 3x as long as wide, with 6 longitudinal sensilla.

Mesosoma (Fig. 352) About 1.3x as long as gaster; pronotum divided mediolongitudinally with row of setae along posterior margin. Mesoscutum and axilla with reticulate cellulate sculpture, axilla with 1+1 long and strong setae covering half of the scutellum length; mesoscutum with complete notauli, scutellum smooth and subequal than mesoscutum, scutellar sensilla almost in the middle and far apart from each other, frenal line with small fovea; metanotum strap like or broad. Propodeum smooth without any carinae; spiracles present.

Fore wing (Fig. 350, 351) narrow 6.15x as long as broad; venation short hypocheta reaching posterior margin, marginal vein with one (distal) dorsal macrocheta and one short ventral seta at apex, disc hyaline (totally), evenly setose, setae below venation and around base are transparent, longest marginal fringe 1.6x as long as wing width. Hind wing 19.8 x as long as wide with a row of setae on anterior margin; fore tibia with 7–8 conical sensilla.

Metasoma (Fig. 353) longer than mesosoma length (178:128) , petiole subquadrate with 4–5 ridges dorsoanteriorlly; tergites 5 or 6; ovipositor occupying almost whole length of gaster (178: 160) about 1.1 x of gaster length, strongly exserted about 3.2x as long as total length of ovipositor. Ovipositor and hind tibia ratio (230: 95) is 2.4.

Colour. Body dark brown except the funicle segments and legs light brown or pale. Clava darker brown than funicle segments. Middle part of hind, mid femur and tibia including tarsal segments dark brown. Wing hyaline. Ovipositor dark brown.

Relative measurements (slide). DBT, 30; SCL, 30; SCW, 15; PL, 22; PW, 14; CLL, 56; CLW, 18; F1L, 15; F1W, 4; F2L, 40; F2W, 5; F3L, 31; F3W, 4; F4L, 25; F4W, 6; F5L, 24; F5W, 6; F6L, 24; F6W, 7; MESL, 128; MSCL, 40; SCTL, 40;

MTANL, 4; PDL, 23; PETL, 35; PETW, 15; FWL, 400; FWW, 65; FFL, 110; HWL, 218; HWW, 11; HFL, 60; METL, 178; OVL, 230; Ext. OVL, 70; FFm, 80; FTb, 70; FTrs, 120; FBtrs, 45; MFm, 80; MTb, 95; MTrs, 130; MBstr, 50; HFm, 68; HTb, 105; HTrs, 152; HBstr, 70.

Male. Unknown.

Material Examined. *Holotype* Female (under 3 coverslips): INDIA: WEST BENGAL, Darjeeling, Gorabari, 15.vi.2008, Coll. F. R. Khan.

Hosts. Unknown.

Etymology. The holotype named after Dr. M. Hayat, for his contribution to Indian Mymaridae.

Distribution. India: West Bengal.

Comments. This species similar to *P. (P.) bengalense* by scape with transverse striations, pronotum divided mediolongitudinally and propodeum smooth without any carinae but differ by certain characters as follows: fore wing hyaline; ovipositor strongly exserted, 3.2x as long as total ovipositor length and presence of 7–8 conical sensilla on fore tibia. (In *P. (P.) bengalense*: fore wing disc slightly infuscate; ovipositor slightly exserted, 0.07x as long as total ovipositor length; presence of 5 conical sensilla on fore tibia).

6. *Polynema (Polynema) bengalense* sp. nov.

(Figures 354–358)

Description

Female. Body length, 0.76 mm.

Head (Fig. 354) in dorsal view about as wide as mesosoma, face with narrow, subantennal grooves carrying setae; torulus slightly above the mid level of eye and touching pre rbital trabeculae. Vertex with ocelli in obtuse triangles. Mandibles tridentate. Swollen cheeks and temples. Antenna (Fig. 355) much shorter than body, radical fuse with scape, scape with transverse striations and about 2.9x as long as wide and 1,5x of pedicel length; pedicel longer than F1; F2 longest, F3 longer than following funicle segments; F4–F6 subequal in length (F5 slightly longer) and slightly wider than preceeding segments; clava 3x as long as wide, with 7 longitudinal sensilla, 6 of them subapical.

Mesosoma (Fig. 357). Pronotum divided mediolongitudinally with 5 setae along posterior margin. Mesoscutum and axilla with reticulate cellulite sculpture; mesoscutum wider than long as wide; and shorter than mesoscutum, scutellar sensilla almost in the middle and far apart from each other, frenal line with small fovea; metanotum broad. Propodeum smooth and without any ridges on carinae, propodeal setae strong and near posterior margins; spiracles rounded. Fore wing (Fig. 356) 6.4x as long as broad, relatively narrow; venation short, hypocheta reaching to posterior margin, marginal vein with one (distal) dorsal macrocheta and one short ventral seta at apex; disc hyaline (slightly infuscate at basal region) uniformly setose; longest marginal cilia about 2x as long as greatest width of disc. Hind wing much shorter than forewing, 34x as long as broad. Fore tibia with 5 conical sensilla.

Metasoma (Fig. 358) almost equal to mesosoma length; petiole subquadrate with 4–5 ridges dorso-anteriorly; ovipositor occupying the whole length of gaster almost 1.1x as gaster length, slightly exserted beyond its apex; ovipositor and hind tibia ratio 148:95 is 1.5.

Colour. Body dark brown except the antenna and legs light brown. Scape and pedicel yellowish brown dorsal part of pedicel dark brown, F1–F6 light brown, clava darker than funicle. Middle part of Hind femur, hind tibia and mid femur and mid tibia and all tarsal segments dark brown. Wings hyaline except slight infuscation on basal part just after veination and below venation, middle part of gaster dark brown and ovipositor dark brown.

Relative measurements (slide). HL, 58; EH, 40; POL, 28; DBT, 28; SCL, 35; SCW, 12; PL, 23; PW, 8; CLL, 57; CLW, 19; F1L, 15; F1W, 4; F2L, 34; F2W, 4; F3L, 26; F3W, 4; F4L, 18; F4W, 5; F5L, 20; F5W, 6; F6L, 18; F6W, 8; MESL, 133; MSCL, 40; MSCW, 60; SCTL, 30; SCTW, 30; MTANL, 4; PDL, 28; FWL, 375; FWW, 58; FFL, 110; HWL, 275; HWW, 8; HFL, 58; FFm, 70; FTb, 70; FTrs, 100; FBstr, 32; MFm, 70; MTb, 95; MTrs, 100; MBstr, 50; HFm, 80; HTb, 115; HTrs, 125; HBstr 50; METL, 150; PETL, 33; OVL, 140; Ext. OVL, 10.

Male. Unknown.

Material examined. *Holotype* Female (on slide under3 coverslips) INDIA: WEST BENGAL: Darjeeling, Gorabari, 15.vi.2008, Coll. F.R. Khan.

Hosts. Unknown.

Etymology. The species is named after the Indian state from where the holotype was collected.

Distribution. India: West Bengal.

Comments. *P. (P.) bengalense* sp. nov. is closely related to *Polynema (P.) hayati* sp. nov. by clava 3x as long as broad and fore tibia with 5–8 conical sensilla but differ by scape 2x as long as broad; fore wing disc slightly infuscate and ovipositor slightly exserted, 0.07x as long as total ovipositor length. In *P. (P.) hayati* sp. nov.: scape 2.9x as long as broad; fore wing hyaline and ovipositor strongly exserted, 3.2x as long as total ovipositor length.

7. ***Polynema (Polynema) anamalaiense*** Mani & Saraswat

Polynema anamalaiense Mani & Saraswat, 1973:113-114. Male. India, Kerala (USNM, not examined)

Polynema anamalaiense Mani and Saraswat: Hayat & Anis, 1999c: 324, key. Anis & Rehmat, 2013: 7, checklist. Manickavasagam & Rameshkumar, 2013: 567, checklist.

Diagnosis

Male. Body length, 0.8 mm. Scape about 2x as long as broad with transverse ridges, pedicel broader than scape, 1.2x as long as wide. F1 longest, rest funicle segments subequal in length, last segment longer than preceding segments. Fore wing 4x as long as broad, marginal fringe about 0.75x as long as wing width. Petiole 3x as long as broad.

Colour. Body dark brown to black except scape pale brown, pedicel and F1 yellowish brown. Legs pale yellowish-brown except last tarsal segments dark brown.

Female. Unknown.

Hosts. Unknown.

Distribution. India: Kerala.

Comments. This species is based on male and above daignosis is based on original description and illustrations given by Mani & Saraswat (1973).

8. *Polynema (Polynema) crassa* Mani & Saraswat

Polynema crassa Mani & Saraswat, 1973: 114. Male. India, Dalhousie (USNM, not examined). Subba Rao & Hayat, 1983: 139, catalogue. Subba Rao & Hayat, 1986: 190, catalogue, 1989: 1429, description. Hayat & Anis, 1999c: 324, 329. key, illustrations.

Polynema crassa Mani & Saraswat: Anis & Rehmat, 2013: 7, checklist; Manickavasagam & Rameshkumar, 2013: 567, checklist.

Diagnosis

Male. Body length, 1.2 mm. Face with sub antennal grooves (Mani et. al, 1973; Fig. 70 D). Antennal club equal to the three preceding funicular segment, 3.70x as long as broad. Fore wing about 3.33x as long as broad, maximum marginal fringe about 0.75x as long as wing width. Hind wing shorter than fore wing. Petiole longer than broad.

Colour. Body very dark brown to black; head dark brown. Antenna dark brown; legs dark brown, except tarsi; last tarsal segments of all the legs dark brown; wing hyaline except infuscation at base, veins dark brown.

Female. Unknown.

Hosts. Unknown.

Distribution. India: Himachal Pradesh.

Comments. This species is based on male. The above diagnosis is based on original description and illustrations given by Mani *et al.*, 1973.

9. *Polynema (Polynema) kalatopense* Mani & Saraswat

Polynema kalatopensis Mani and Saraswat, 1973: 122–123. Male. India, Dalhousie (USNM, not examined). Subba Rao & Hayat, 1983: 139, catalogue. Subba Rao & Hayat, 1986: 190, catalogue. Mani, 1989: 1416, description. Hayat & Anis, 1999c: 324, key, illustrations.

Polynema kalatopense Mani & Saraswat: Anis & Rehmat, 2013: 7, checklist. Manickavasagam & Rameshkumar, 2013: 567, checklist.

Diagnosis

Male. Body length, 0.8 mm. Antennal clava about 3.8x as long as broad; fore wing narrow, 5x as long as broad, with marginal fringe about 1.5x as wing width. Hind wing shorter than fore wing.

Colour. Body very dark brown; head very dark brown; legs except last tarsal segment of all legs, pale yellow to brownish yellow.

Female. Unknown.

Hosts. Unknown.

Distribution. India: Himachal Pradesh.

Comments. This species is based on male. The above diagnosis is based on original description and illustrations given by Mani & Saraswat (1973).

11. Genus *Pseudanaphes* Noyes & Valentine

(Fig. 359–365)

Pseudanaphes Noyes & Valentine, 1989; 47. Type species *Pseudanaphes hirtu* Noyes & Valentine, by original designation, Jourl. Meus.

References. Lin, 1997: 98, diagnosis. Lin *et al.*, 2007: diagnosis.

Diagnosis

Female. Body nearly smooth, without sculpture. Head (Fig. 359) with frontovertex about half of head width and 2x as broad as an eye; antennal toruli separated from transverse trabeculae at most by their own diameter. Antennal radicle (Fig. 360) distinct; antennal formula, 1163; clava 3-segmented, the suture transverse. Mandible with 3 sharp teeth. Pronotum in the Indian species, medially membranous; notaul distinct (Fig. 363); scutellum consisting of an anterior and posterior part, the outer part bearing circular pits; propodeum long, at least about half the length of scutellum; propodeum with a pair of long setae. Fore wing (Fig. 361) moderately broad, with disc densely setose; venation not reaching to half length of wing marginal and stigmal veins long. Tarsal formula 4-4-4. Metasoma (Fig. 365) with variable lengths of tergite. Ovipositor at most as long as gaster; hypopygium not reaching to apex of gaster.

Colour. Body dark brown; antennal segments yellowish brown to brown. Fore wing hyaline with the curved infuscate band behind proximal half of marginal vein, and infuscate behind submarginal vein. Legs yellow to pale brown.

Male. Illustrated key by Lin *et al.* (2007) from an indetermined specimen. Almost similar to female except for the antennae and genitalia. Antenna 13-segmented.

Hosts. Unknown.

Distribution. It is known from Australia, China, India and New Zealand.

Species. World, 5 species (Rehmat & Anis, 2011); India, one species.

Comments. This genus strongly resembles with genus *Anaphes* but distinguish by antennal clava large, with 3-segmented; fore wing venation extending upto 0.4x a

wing length, apex evenly rounded and disc evenly setose; propodeum without longitudinal median carinae. The type species, *P. hirtus* Noyes & Valentine (1989), was based upon specimens collected in New Zealand; *P. zhaoi* Lin (1997), from China and two Australian species *P. lincolni* (Girault, 1913) and *P. particoxae* (Girault, 1938) described in the genus *Polynemoidea* Girault but recently transferred to *Pseudanaphes* by Lin *et al.*, (2007).

1. ***Pseudanaphes sikkimianus*** Rehmat & Anis

(Figures 359–365)

Pseudanaphes sikkimianus Rehmat & Anis, 2011: 14–16, Female, Sikkim, India (ZDAMU, examined).

Pseudanaphes sikkimianus Rehmat & Anis: Anis & Rehmat, 2013: 7, checklist. Manickavasagam & Rameshkumar, 2013: 567, checklist.

Diagnosis

Female. Head (Fig. 359). Vertex with 6+6 long, brown setae; frons and face below transverse trabecula with 12+12 long, brown setae. Antenna (Fig. 360) with F6 bearing one longitudinal sensilla; first segment of clava without sensillum, second segment of clava with 2 sensilla and third segment of clava with 3 sensilla. Pronotum in middle fifth membranous, and lateral plate with 3 long and 2 short setae along collar; mid lobe of mesoscutum with 1+1 setae, each side lobe with one and each axilla with one seta; scutellum without setae; propodeum with a propodeal setae in about mesal fourth; medial length of propodeum 0.62x scutellum length. Fore wing (Fig. 361) 3.33x as long as broad, with marginal fringe 0.48x of wing width. Hind wing (Fig. 362) 15.4x as long as broad, with marginal fringe 2.4x as long as wing width; disc beyond venation with about 3 lines of setae between the usual line along anterior and posterior margins. Fore leg (Fig. 364) with protibia bearing 8 peglike setae. Metasoma (Fig. 365) about as long as mesosoma; ovipositor originating from about level of second gastral tergite.

Colour. Body dark brown except anterior scutellum brownish-yellow. Mandibles and antenna with radicle, scape, pedicel and funicle brownish-yellow, dorsal margins of scape and pedicel brown; clava dark brown. Fore wing hyaline with the

usual curved infuscate band behind proximal half of marginal vein, and infuscate behind submarginal vein. Hind wing with faint infuscation. Legs brownish-yellow; fore tibia and tarsal segments 1–4 of mid and hind legs and 1–3 of fore leg yellow; tarsal segments 4 of fore leg pale brown.

Male. Unknown.

Type material examined: *Holotype* Female (on slide under 3 coverslips) INDIA: SIKKIM, Gangtok, Hanumantok, 15.x.2008, Coll. F.R.Khan. (ZDAMU) Registration No. "HYM. CH. 622".

Hosts. Unknown.

Distribution. India: Sikkim.

Comment. This species is the first time recorded from India by Rehmat & Anis, 2009. *P. sikkimianus* Rehmat & Anis close to *P. zhaoi* Lin (1997), but differs by distance between posterior ocellus and eye margin small; F5 subequal in length to F4, clava as long as F2-6 combined; F4 without longitudinal sensillum; anterior scutellum without setae; fore wing 3.33x as long as broad with marginal fringe 0.48x of wing width; hind wing 15.4x as long as broad, with marginal fringe 2.4x as long as wing width. (in *zhaoi*, anterior scutellum with one pair of setae; fore wing about 2.85x as long as broad, with marginal fringe about one-third of wing width; hind wing 12x as long as broad with marginal fringe 1.7x as long as wing width).

12. Genus *Schizophragma* Ogloblin

(Figures 366–371)

Schizophragma Ogloblin, 1949: 345. Type species *Schizophragma basalis* Ogloblin, by original designation.

Schizophragma Ogloblin: Annecke & Doutt, 1961: 21-23, As subgenus of *Patasson* Walker (= *Anaphes* Haliday)

References. Huber, 1987: 823–855, world review. Rehmat & Anis, 2014b: 1–6, diagnosis, checklist.

Diagnosis

Female. Face (Fig. 366) with subantennal sulci indistinct or absent; antennal torulus separated from transverse trabecula at most by slightly more than its own diameter. Mandible with 4 sharp teeth. Antennal formula, 1162; radicle fused with scape; scape with transverse ridges; funicle (Fig. 367) with longitudinal sensillum on one to five funicle segments; clava 2-segmented, proximal and distal segments with longitudinal sensillum. Mesosoma (Fig. 370) with pronotum divided medially; mesoscutum with notauli distinct; scutellum divided into anterior and posterior parts, the anterior part with 1+1 setae near circular pits; posterior scutellum distinctly striated, and divided longitudinally; propodeum with a pair of setae; mesophragma with a deep or a shallow notch. Fore wing (Fig. 368) moderately broad with disc densely setose; variable number (2–40) of setae present behind marginal and stigmal veins; venation not reaching to half length of wing; proximal macrochaeta shorter than distal macrochaeta. Tarsi 4-segmented. Metasoma with T6 small (Fig. 371); ovipositor with second valvifers enlarged basally, and shortly exserted; hypopygium not reaching to apex of gaster.

Colour. Head and mesosoma dark brown; metasoma, either completely dark brown or with some segments yellow to white.

Male. Antenna with 11-segmented flagellum. Genitalia relatively small, simple and encapsulated (Huber, 1987; Fig. 28 & 29).

Hosts. Unknown from India. Elesewhere, recorded hosts (eggs) belong to the Membracidae (Hemiptera).

Distribution. Nearctic and Neotropical regions (Huber, 1987). The genus has also been recorded from undescribed species from Australia (Lin *et al.*, 2007), appears to be conspecific with *S. indica.*

Species. World, 7 (Huber, 1987); India, one species (present work).

Comments. As noted by Huber (1987), *Schizophragma* is close to *Stethynium* Enock, but differs by a 2-segmented clava (except entire in *Schizophragma saltensis* Ogloblin), presence of one pair of setae on anterior scutellum, mesophragma variously notched at apex, and largely dark brown colour, and in the male by the encapsulated genitalia. In *Stethynium*: clava 3-segmented with sutures obliquely curved, anterior scutellum without setae, mesophragma with apex rounded, and body usually yellow with some parts with brown suffusions, and male genitalia complex and non-encapsulated.

Checklist of World species of Genus *Schizophragma*

1. *Schizophragma basalis* Ogloblin (Argentina)
   Schizophragma basalis Ogloblin, 1949: 345–350.
   Host. *Acanophora sp.* (Hemiptera: Membracidae).

2. *Schizophragma bicolor* (Dozier) (Haiti, Mexico, Puerto Rico, St. Kitts-Nevis, U.S.A.)
   Anaphes bicolor Dozier, 1932: 88.
   Stethynium annulatum Doutt, 1947: 152, U. S. A. Synonymy with *S. bicolor* by Huber, 1987: 834.

3. *Schizophragma latipennis* (Crawford) (Costa Rica, Panama, Trinidad)
   Anaphoidea latipennis Crawford, 1913: 350.
   Hosts. *Horiola arcuata* (Fab.), *H. picta* Coquebert, *Campylenchia hastat* (Fabr.), *Vanduzea* sp. (Ogloblin, 1949; Huber, 1987).

4. *Schizophragma parvula* Ogloblin (Argentina)
   Schizophragma parvula Ogloblin, 1949: 355–356.
   Schizophragma nana Ogloblin, 1949: 356–358. Synonymy into *S. parvula* by Huber, 1987; 839.

5. *Schizophragma peruana* Ogloblin (Peru)
   Schizophragma peruana Ogloblin, 1949: 353–355.

6. *Schizophragma saltensis* Ogloblin (Argentina, Trinidad)
   Schizophragma saltensis Ogloblin, 1949: 352–353.

7. *Schizophragma squamosa* Ogloblin (Argentina)
   Schizophragma squamosa Ogloblin, 1949: 350–352.

1. *Schizophragma indica* Rehmat & Anis

(Figures 366–371)

Schizophragma indica Rehmat & Anis, 2014b: Female, Uttar Pradesh, India (ZDAMU, examined).

Diagnosis

Female. Body length, (mesosoma + metasoma), 0.58 mm.

Head (Fig. 366). Vertex with fine rugose reticulate sculpture, with 2 setae in ocellar triangle (= stemmaticum), a seta each on sides of anterior ocellus, and a seta in front of anterior ocellus; face with a pair of long bristle-like setae apart from 3 setae each on sides of face and 2 pairs between the bristles and mouth margin. Antenna (Fig. 367) with scape about as long as pedicel, F1and F2 combined, with 7 or 8 transverse ridges on inner surface; pedicel almost as long as F3; F1 and F2 shorter than F3; F3 3x as long as broad and longer than F4; F5 subequal in length to F3 and longer than F6; clava large, as long as F1–4 combined, 2-segmented, the suture oblique; longitudinal sensillum on F3 (one), F5 (one), first segment of clava (1) and second segment of clava (5) with a modified seta at apex. Length (width) of antennal

segments: Scape, 28 (13); pedicel, 14 (6.5); F1, 7 (5); F2, 8.5 (5); F3, 15 (5); F4, 10 (5); F5, 15 (6); F6, 10 (6); CLL, 43.

Mesosoma (Fig. 370) Mid lobe of mesoscutum almost equal in length to scutellum (35:36), with largely longitudinally lineolate reticulate sculpture except anterior fifth where the sculpture consist of transversely elongate cells; posterior scutellum1.7x as long as anterior part of scutellum, with lineolate reticulate sculpture; mid lobe with 2 setae; each side lobe with one seta; anterior scutellum with 2 setae; metanotal dorsellum with rounded posterior margin, and with one small seta on each side of dorsellum; propodeum with one seta behind each spiracle; mesophragma with deep angular notch (Fig. 370). Fore wing (Fig. 368) 3.83x as long as broad; longest seta of marginal fringe 0.71x wing width; venation and discal setation as in Fig. 369. Hind wing, only one hind wing is available; hind wing disc with one row of setae along anterior margin and two rows along posterior margin; longest seta of marginal fringe about 3.8x as long as wing width. Fore tibia with two rows of 4 or 5, and 4 spine-like setae; length of mesotibia, 63, length of mesotarsus, 65; length of hind tibia, 68; length of metatarsus, 70. Metasoma 1.36x as long as mesosoma; ovipositor extending from base of gaster and shortly exserted; second valvifer basally enlarged.

Colour. Head and mesosoma dark brown; metasoma with T1 and partly T2 white, T3–5 dark brown, the band-like T6 nearly black, T7 white; Antenna yellow; dorsal margin of scape and pedicel brownish yellow; clava brown. Wings hyaline. Legs, including coxae, pale yellow.

Male. Unknown (see below).

Material examined. *Holotype* Female (on slide under 3 coverslips): INDIA: UTTAR PRADESH: Balrampur: Sesai Ghat, 6.x.2006, Coll. F. R. Khan. (ZDAMU, Registration No. HYM.CH. 637).

Paratypes 3Females (on slides): INDIA: UTTAR PRADESH: Sesai Ghat, 6.x.2006; 1f (on slide): Mathura: Barari, 29.viii.2007, Coll. F. R. Khan. (1 female in NPC, 3 females in ZDAMU, Registration No. HYM.CH. 637)

Hosts. Unknown.

Distribution. India: Uttar Pradesh.

Comments. *Schizophragma indica* Rehmat & Anis, runs to *S. parvula* Ogloblin in the key to species given by Huber (1987), but differs by the presence of deep Λ-shaped notch in mesophragma; presence of about 7 setae behind marginal vein, U-shaped arrangement of setae behind stigmal vein; relatively shorter F1 and F2, and longer F3 and F5; clava as long as F1–4 combined. In *S. parvula*: mesophragma with a small notch at apex; at most 6 setae behind marginal vein and setae absent behind stigmal vein; relatively longer F1 and F2 (F1, 1.66–2.0x; F2, 1.84– 2.4x) and relatively shorter F3 and F5 (F3, 2.11–2.42x; F5, 1.66–1.7x); and clava shorter than F1–4 combined (Based on description and figures given by Ogloblin [1949]).

This species resembles *S. latipennis* (Crawford) and *S. basalis* Ogloblin, in having deep Λ-shaped notch in mesophragma, but these two species have longitudinal sensillum on F2, F3, F5 and F6 (Huber, 1987).

Male

I have in ZDAMU a single male with date same as for holotype of *S. indica*. But this male has a small tooth in middle of posterior margin of dorsellum of metanotum, as in the female of *Schizophragma peruana* Ogloblin (Ogloblin, 1949: Fig. 13). Therefore, this male is not considered conspecific with the female of the *S. indica* Rehmat & Anis.

13. Genus *Stephanodes* Enock

(Figures 372–378)

Stephanodes Enock, 1909: 457. Type species *Stephanodes elegans* Enock, by monotypy.

Eustephanodes Ogloblin, 1967: 194. Type species *Eustephanodes missionicus* Ogloblin, by original designation. Synonymized by Yoshimoto, 1990: 72.

Masonana Yoshimoto, 1990: 63. Type species *Masonana polynemoides* Yoshimoto, original designation. Synonymized by Huber & Fidalgo, 1997: 34.

References. Huber & Fidalgo, 1997: 27-63, review of World species. Triapitsyn & Berezoviskey, 2000: 1–11, review of species from Primorskii Krai (Russia).

Diagnosis

Female. Antenna 11-segmented, formula 1161; clava solid. Vertex with large, swallow depression outside each ocellus (Fig. 372). Scape (Fig. 373) with inner surface rasp like, with imbricate sculpture; prothoracic spiracles placed mesad of normal position, on the line between pronotum and mesoscutum; propodeum without median carinae. Tarsal formula, 4–4–4.

Colour. General body dark brown to black. Legs usually somewhat lighter than body, colour of antennal segments variable, from brown to dark brown.

Male. Similar to female, except from the genitalia and antennae. Antenna 13-segmented.

Hosts. Unknown from Indian species. Elsewhere reported from Nabidae & Cicadellidae (Huber & Fidalgo, 1997).

Distribution. Cosmopolitan.

Species. World, 6 species; India, one species.

Comments. *Stephonodes* comes under *Polynema* group of genera and generally confused with the *Polynema*, but differ by scape, with rasp-like inner surface, with

imbricate sculpture; vertex with large, shallow depression outside each ocellus; face with a pit next to each torulus.

1. *Stephanodes reduvioli* (Perkins)

(Figures 372–378)

Polynema reduvioli Perkins, 1905: 196. lectotype–Female, Hawaiian Islands (BMNH), not examined].

Stephanodes reduvioli (Perkins): Huber & Fidalgo, 1997: 41. Beardsley & Huber, 2000: 17. Triapitsyn & Huber, 2000: 614. Anis & Rehmat, 2013: 7, checklist. Manickavasagam & Rameshkumar, 2013: 567, checklist.

Diagnosis

Female. Body length, 0.9 mm. The presence of sickle-shaped sensillum (Fig. 374) on F3 separates most female *S. reduvioli* from *S. similis*. As for *S. similis*, F3 lacks sickle-shaped sensillum. In Indian species of *S. reduvioli* sometimes lacks sensillum on F3 on any one of the antenna.

Relative measurements (slide): FVW, 70; EH, 42; DBT, 20; TMMD, 25; SCL, 30; SCW, 15; PL, 21; PW, 12; CLL, 60; CLW, 21; F1L, 32; F1W, 4; F2L, 33; F2W, 5; F3L, 28; F3W, 5; F4L, 23; F4W, 6; F5L, 23; F5W, 7; F6L, 23; F6W, 10; MESL, 134; MSCL, 50; SCTL, 38; FWL, 440; FWW, 100; FFL, 65; HWL, 310; HWW, 8; HFL, 46; FTb, 100; FBstr, 40; MTb, 120; MTrs, 108; HTb, 140; HBstr, 60; METL, 128; OVL, 95; Ext.OVL, 5.

Male. Similar to female except in antennal structure and genitalia. Antenna with a 11-segmented flagellum.

Material examined. INDIA: ORISSA: Jharsuguda, Sarbahal, 2Females (on slides), 15.xii.2007, Coll. F.R. Khan; WEST BENGAL: Darjeeling, Gorabari, 1Female (on slide), 15.vi.2008, Coll. F.R. Khan; New Alipurduar, Marich Bari; 1Female (on slide), 20.v.2008, Coll. F.R. Khan; Chhat, Purdanpura, 1Female (on slide), 30.v.2008, Coll. F.R. Khan; Cooch Behar, Mati Khata, 3Females (on slides), 25.v.2008, Coll. F.R. Khan.

Additional material examined. INDIA: UTTAR PRADESH: Aligarh, 1Female (on slide), 21.v.1977, Coll. M. Hayat; 1Female (on slide), march 1987, Coll. M. Hayat; 1Female (on slide); 10.xii.1980, Coll. M. Hayat; 1Female (on slide), june, 1985, Coll. S. Singh; 1Female (on slide), 7.ix.1979, Coll. M. Verma; 1Female (on slide); 30.iv.1979, Coll. M. Verma; 1Female (on slide); 30.iv.1980, Coll. M. Verma; Bareilly; 1Female (on slide), 7.x.1978, Coll. M. Verma; UTTRAKHAND: Dehra dun, Dear Park, 1Female (on slide), 10.iv.1979, Coll. M. Verma; Mussoorie, 1Female (on slide), 11.iv.1978, Coll. M. Verma; HIMACHAL PRADESH: Mandi, Chandiyal, 1Male, 1Female (on card), 26.vi.2006, Coll. S.M.A. Badruddin & F.R. Khan; Solan, Bergaon, 3Males, 1Female (on cards), 16.vi.2006, Coll. S.M.A. Badruddin & F.R. Khan.(all determined by M. Hayat as *Stephonodes imbricatus*).

Hosts. Unknown from India. Elsewhere reported from Nabidae.

Distribution. India: Andhra Pradesh, Bihar, Delhi, Himachal Pradesh, Karnataka, Orissa, Tamil Nadu, Uttar Pradesh, West Bengal.

Comments. It is very common species of Indian region and closely related with *S. similis* but sickle-shaped sensillum on F3 separates most female *S. reduvioli* from *S. similis*. One specimen of *S. reduvioli* in the present work out of eight specimens, have sickle-shaped sensillum found on F1, but all other specimens have sickle-shaped sensillum from F3-F6.

14. Genus *Stethynium* Enock

(Figures 379–384)

Stethynium Enock, 1909: 452. Type species *Stethynium triclavatum* Enock, 1909 by monotypy.

Stethynium Enock: Annecke & Doutt, 1961: 8. Schauff, 1984: 48. Huber, 1987: 828. Noyes & Valentine, 1989: 53. Yoshimoto, 1990: 44. Triapitsyn & Huber, 2000: 614, key to species. Anis & Rehmat, 2013: 7, checklist. Manickavasagam & Rameshkumar, 2013: 567, checklist.

References. Huber, 1987: 823–855, review of non-Australian species. Triapitsyn, 2002: 1–13, review of species from Primorskii krai (Russia). Huber *et al.*, 2006: 1909–1921, Australian species records, parasitoid records.

Diagnosis

Female. Head with prominent subantennal grooves or sulcus on face; mandible 4-dentate; antenna (Fig. 379) 11-segmented, formula 1163; clava 3-segmented, compact with oblique sutures separating the segments, first segment subequal or slightly longer than second segment and last segment about 2x as long as first segment. Scape fused with radicle and contains 10–12 transverse ridges on inner surface. Clava with two longitudinal sensilla on each first two segments and third segments contain two lateral and one dorsal longitudinal sensilla. Pronotum divided longitudinally by a suture medially. Posterior scutellum about twice as long as width of each lobe; mesophragma broadly rounded apically and extending to the metasoma. Forewing (Fig. 381) with a distinct, rounded basal lobe behind venation, narrow beyond venation and widening evenly towards rounded to slightly pointed apex; stigmal vein, and marginal vein at level of distal macrochaeta distinctly thicker than at level of hypochaeta; discal setae arranged evenly beyond venation. Petiole appears absent; ovipositor originate mostly from the TII and slightly exserted beyond apex of metasoma Cercal setae four in number. Legs with fore tibia having conical sensilla in two rows. Tarsal formula, 4-4-4.

Colour. Body mostly yellow except legs, some parts of mesosoma, antennal segments and tergites sometimes brown infuscations.

Male. Similar to female, except from the genitalia and antennae. Genitalia relatively complex as females, with large triangular lobes and apical apodeme.Antenna 11-segmented.

Hosts. Cicadellidae; gall-forming Eulophidae.

Distribution. Cosmopolitan.

Species. World, 49 species; India, one species from India.

Comments. Genus *Stethynium* seems very closed to Genus *Schizophragma* but distinguished by 3-segmented clava with oblique sutures, mesophragma projecting into metasoma with rounded margins posteriorly and body usually yellow with some parts with brown suffusions, and male genitalia complex and non-encapsulated.

1. ***Stethynium empoascae*** Subba Rao

(Figures 379–384)

Stethynium empoascae Subba Rao, 1966: 189, 191, Female. Delhi, India (NPC, not examined).

Stethynium empoascae Subba Rao: Huber, 1987: 829 (As synonymy of *S. triclavatum* Enock).

Stethynium triclavatum Enock: Hayat, 1992: 83–89. Misidentification.

Stethynium empoascae Subba Rao: Triapitsyn, 2002: 10, as a valid species. Anis & Rehmat, 2013: 7, checklist. Manickavasagam & Rameshkumar, 2013: 567, checklist.

Diagnosis

Female. Body length, 0.51 mm. (Fig. 379). Mandibles 4-dentate. Scape striated (Fig. 379); F1 0.84x shorter than pedicel length; F5 shortest. Mesosoma (Fig. 384) 0.57x of gaster length. Pronotum is visible in dorsal view of thorax; mesoscutum is shorter than scutellum almost more than half of the length of scutellum. Fore wing (Fig. 381) about 4.77x as long as broad. Hind wing (Fig. 382) about 15x as long as

broad. Metasoma (Fig. 383), 1.73x longer than mesosoma length; ovipositor exserted.

Colour. Body yellow except head brown; mandibles dark brown. Antenna brown except clava dark brown. Fore wing hyaline at apex and slightly infuscate at the basal part. Hind wing slightly infuscate.

Relative measurements (slide): HW, 60; HL, 52; EH, 35; DBT, 20; MDL, 13; SCL, 23.5; SCW, 10; P, 13; PW, 10; CLL, 39; F1L, 11; F2L, 12.5; F3L, 10; F4L, 10; F5L, 9.5; F6L, 12; MESL, 80; MSCL, 30; SCTL, 50; FWL, 210; FWW, 44; FFL, 52; HWL, 180; HWW, 12; HFL, 148; FTb, 45; MTb, 73; FBstr, 18; MBstr, 15; HTb, 66; HBstr, 10; METL, 150; OVL, 110; Ext.OVL, 20.

Male. Similar to female except in antennal structure and genitalia. Antenna (Fig. 380) with a 11-segmented flagellum.

Host. *Amrasca devastans* (Distant).

Distribution. India: Delhi, Karnataka, Punjab, Uttar Pradesh. (Australia).

Material examined. INDIA: UTTAR PRADESH: Nagla Dawoodpur, 1Female (on slide), 6.iv.2007, Coll. F.R. Khan; Tundla, Sikrari; 1Female, 1Male (on slide), 01.ix.2007, Coll. F.R. Khan; PUNJAB: Pthankot, Sujanpur, 1Female (on slide), 10.vii.2006, Coll. S.M.A. Badruddin & F.R. Khan.

Additional material examined. INDIA: UTTAR PRADESH: Aligarh, 1Female (on slide), November, 1980, Coll. M. Hayat; 1Female (on slide), 3.xi.1982, Coll. M. Hayat. (determined by M. Hayat, as *Stethynium triclavatum* in 1991).

Comments. The specimens recorded here were compared with the specimens present in ZDAMU and with their original description and figures.

CHAPTER 2:

PHYLOGENY

Phylogeny of the Indian Mymaridae

Introduction

A phylogenetic analysis of the Indian genera of Mymaridae was conducted in order to estimate the evolutionary relationship of the group.

The family Mymaridae evolved from a monophyletic lineage and it may be the sister group of the rest of the Chalcidoidea (Schauff, 1984). Some characters like long clubbed antennae in the females, tarsal segments 4 to 5, shows common ancestry for the family Mymaridae. Some unique characters such such as the presence of 'H-shaped' trabeculae on head, which is a uniquely derived character and separate family mymaridae from other chalcidoid families. Absence of this character prompts Debauche (1948) to placed mymarommids into a separate family viz. Mymarommatidae, removed from the family Mymaridae. Toruli are quite widely separated and placed always close to eyes than to each other, this character is also uniquely derived for the family.

Schauff (1984) proposed division of the family into different generic groups, rather than into subfamilies or tribes due to the monophyletic character of the family. Recently Lin *et al.* (2007) placed all the Australian genera into 12 groups on the basis of only females. There was no such work was from Indian fauna and the present work should be considered as preliminary attempt towards this way.

Methods. Some programs are readily available for constructing phylogenetic trees on Internet browsers and many methods have been published (Wiley, 1981; Schauff, 1984; Heraty, 2013). In present study two softwares were used; one is NEXUS data editor 0.5.0 for entry of the data or character matrix and for creating and editing NEXUS format data files. NDE software developed by Roderic D. M. Page, freely available for Windows 95, NT 4.0 or later and source on the internet for NDE is http://taxonomy.zoology.gla.ac.uk/rod/rod.html). Another is PAUP 4.0b10 for 32-bit Microsoft windows (Preliminary beta-test version) is a package for inference of evolutionary trees, for use in Machintosh, Windows and Unix/VMS version. Based on results of previous phylogenetic analysis of superfamilies Chalcidoidea and Mymarommatoidea by Schauff (1984); Gibson (1986) & Gibson *et al.*, (1999), resultant tree was rooted with outgroup represented by Genus *Mymaromma* Girault.

The genus *Mymaromma* Girault (Mymarommatidae: Mymarommatoidea) and the Mymarommatoidea was considered as the sister group of the Chalcidoidea by Gibson (1986) and Gibson *et al.* (1999, 2007). The genus *Mymaromma* was taken as an outgroup as most of the characters appears to be plesiomorphic. All the characters of outgroup used in the phylogenetic analysis is taken from available literature and some slide mounts present in ZDAMU collections, determined by M. Hayat. As present work is a preliminary step towards elucidating the phylogeny, and limits with slide and card mounts related with my own study and also present in ZDAMU and all available literature of the Indian genera of the Mymaridae.

Terminal taxa. Including outgroup and 32 valid Indian genera (see summary below) were taken for this study. All the characters with respect to outgroup was studied and from slide mounted specimens, or wherever necessary from card mounted specimens. The recently recorded genus *Schizophragma* Ogloblin by Rehmat & Anis (2014b) was also included in this study.

Characters and Character Matrix. There are 43 binary and multistate morphological characters used in the present analysis; all characters were treated as unweighted and unordered. All the character employed here is based on females. The taxa were arranged in alphabetical order in the data matrix. The data matrix used was presented in Table 1. Within summary a description of each character and its related states was given. In the matrix, each plesiomorphic state (or hypothesized primitive state) coded is '0', and apomorphies (advanced states) coded is 1, 2 etc. as Nexus data editor reads only in Arabic numeral only. Unknown character states were indicated by "?" in data matrix.

Summary by NEXUS Data Editor

Number of genera: 32, number of characters: 43

Genera

1. *Mymaromma* (Outgroup)
2. *Acmopolynema*
3. *Alaptus*
4. *Anagroidea*
5. *Anagrus*
6. *Anaphes*
7. *Arescon*

8. *Australomymar*
9. *Camptoptera*
10. *Camptopteroides*
11. *Callodicopus*
12. *Cleruchus*
13. *Dicopomorpha*
14. *Dicopus*
15. *Eofoersteria*
16. *Erythmelus*
17. *Eubroncus*
18. *Gonatocerus*
19. *Himopolynema*
20. *Kikiki*
21. *Litus*
22. *Mymar*
23. *Narayanella*
24. *Omyomymar*
25. *Ooctonus*
26. *Palaeoneura*
27. *Polynema*
28. *Pseudanaphes*
29. *Ptilomymar*
30. *Schizophragma*
31. *Stephanodes*
32. *Stethynium*

Characters

The following is the list of characters and states used in the phylogenetic analysis (0=plesiomorphic). The polarity of the characters was determined by reference to outgroup.

1. Head

   0 (Head with a hyperoccipital band of pleated membrane)

   1 (Uniformly sclerotized or a single structure with 'H' shaped trabeculae)

2. Mandible dentation

   0 (2-4 dentate)

   1 (Mandibles reduced to small stubs or no teeth/1-segmented)

   2 (Variety of teeth as in genus *Eubroncus*)

3. Mandibles articulation

   0 (Closed to head laterally thick, not meeting each other when closed)

   1 (Projecting ventrally and away from the head, crossed)

   2 (Projecting ventrally not crossed)

4. Antennal toruli pits

   0 (Pits absent)

   1 (Pits present)

5. Separation of toruli

   0 (Very close, separated by only a selender keel-like median ridge)

   1 (Far apart, close to eye margin)

6. Number of female funicle segments

   0 (7-8-segmented)

   1 (5-6 segmented)

   2 (4-segmented)

7. Number of claval segments

   0 (Unsegmented)

   1 (2-segmented)

   2 (3-segmented)

   3 (both segmented and unsegmented)

8. Radicula attachment with scape

   0 (Not clearly separated)

   1 (Clearly separated or distinct from scape)

9. S4 sensilla on clava

   0 (Present 1-2 or more sensilla)

   1 (Absent)

10. Scape sculpture

    0 (Smooth)

    1 (With cross striations or occasionally reticulate)

    2 (Rasp-like sculpture)

11. Scape edges

0 (Smooth)

1 (Not smooth, occasionally with 1-2 setaceous teeth)

12. Second funicle segments

0 (Normal, without ring segment)

1 (With ring segment, occasionally not ring like)

13. Sensilla of antennal segments

0 (Only clava with any sensilla)

1 (Some funicle segments and clava with longitudinal sensilla)

14. Pronotum carina

0 (Smooth without carina)

1 (With transverse carinae)

15. Pronotal division

0 (Divided with completely or partially divided by a longitudinal suture)

1 (Undivided by any suture)

16. Pronotal setae

0 (Present, small and pointed)

1 (Present, long and modified)

2 (Absent or unknown)

17. Types of notuli

0 (Absent)

1 (Present, complete)

2 (Present, incomplete)

3 (Both complete and incomplete)

18. Types of axillar setae

0 (Short and pointed)

1 (Long and modified)

2 (Absent)

19. Scutellum division

0 (No division)

1 (Anterior scutellum seprated from posterior into two complete separated sclerites)

2 (Posterior scutellum partially or completly divided by a longitudinal su into two lobes)

20. Shape of metanotum

0 (Small transverse band like or selender, dorsomedially)

1 (Broad or enlarged or triangular)

21. Mesophragma

0 (Not well develop or absent)

1 (Well develop or projecting into gaster)

22. Propodeum

0 (Undivided)

1 (Divided by a sulcus)

2 (Divided and undivided both)

23. Propodeal flange

0 (Flange present and complete)

1 (Flange not present)

24. Propodeal seta near each spiracle

0 (Single pair of laterally placed setae)

1 (Two pairs of setae, one laterally and one medially)

2 (Propodeal setae branched)

25. Propodeum with membranous-leaf like expansion

0 (Absent)

1 (Present)

26. Fore wing membrane

0 (Absent for approximately 2/3 of wing length or pedunculate type)

1 (Extending down to the base of wing)

27. Fore wing membrane covering

0 (With reticulate or cell like pattern)

1 (Smooth without any reticulation)

28. Marginal vein relative measurements to fore wing length

0 (Reaching at most 1/4 of wing length or less)

1 (Reaching 2/3 of wing length)

2 (Less than equal to half of fore wing length)

29. Apex of fore wing

    0 (Straight)

    1 (Curving outwards)

    2 (Curving downwards)

30. Submarginal vein

    0 (Parallel to margin of wing, usually bending upwards)

    1 (Slanting away from margin of wing towards the base)

31. Macrocheta and Hypocheta

    0 (Well developed, always present)

    1 (Reduced, difficult to see)

32. Discal setae under fore wing

    0 (Forming distinct line extending across and forward on the wing membrane)

    1 (Line absent, or randomely placed/evenly setose)

33. Types of discal setae

    0 (Unmodified)

    1 (Modified into various forms)

34. Hind wing

    0 (Reduced or hair like, without membrane)

    1 (Well developed)

35. Tarsi

    0 (5- segmented)

    1 (4-segmented)

    2 (3-segmented)

36. Petiole segmentation

    0 (2 segmented)

    1 (Unsegmented)

37. Abdomen

    0 (Abdomen petiolate)

    1 (Abdomen subsessile)

    2 (Abdomen subsessile type 1)

    3 (Abdomen subsessile type 2)

    See details of these two states of character in Schauff (1984)

38. Number of Cercal setae

0 (Four in number)

1 (Three in number)

39. Hypopygium

0 (Absent or poorly developed)

1 (Well developed)

40. Gastral spiracle

0 (Present)

1 (Absent)

41. Type of foretibial spur

0 (Comparatively short straight and simple)

1 (Long with bifurcate at tip)

42. Hind legs size and setation

0 (Relatively subequal in size by fore and mid legs and without much setation)

1 (Long hind legs with long and thickly arranged setae)

43. Mesophragma apex

0 (Rounded)

1 (Notched apex)

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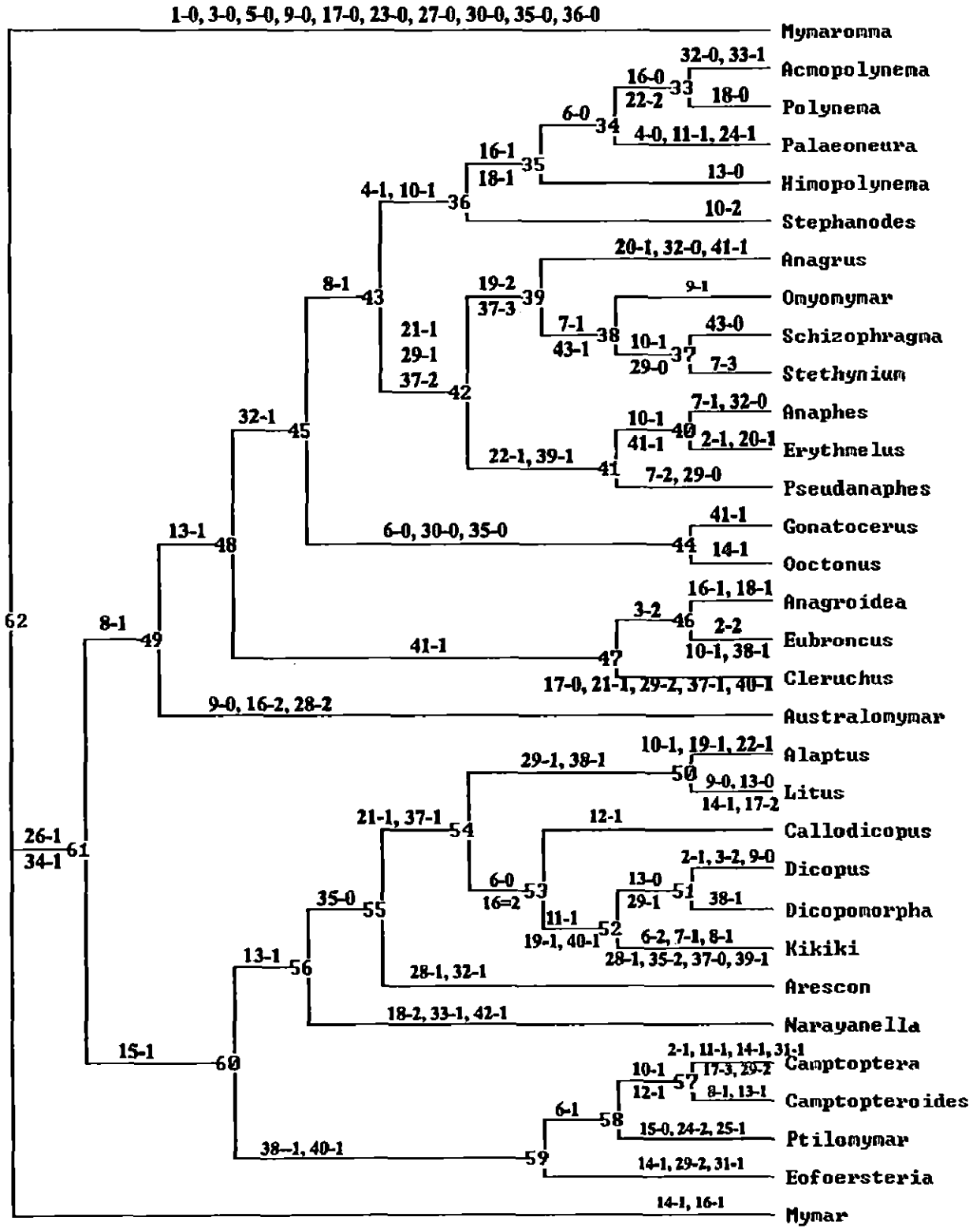

Fig.1. Hypothesis of relationships of the Indian genera of Mymaridae

Table 2. List of Apomorphic characters and their state changes on each node

Nodes	Character numbers	State change
Node 62 => *Mymaromma*	1 (Head)	1 ⟹ 0
	3 (Mandibles articulation)	1 ⟹ 0
	5 (Separation of toruli)	1 ⟹ 0
	9 (S4 sensilla on clava)	1 ⟹ 0
	17 (Types of notuli)	1 ⟹ 0
	23 (Propodeal flange)	1 ⟹ 0
	27 (fore wing membrane covering)	1 ⟹ 0
	30 (Submarginal vein)	1 ⟹ 0
	35 (Tarsi)	1 ⟹ 0
	36 (Petiole segmentation)	1 ⟹ 0
Node 62 => node 61	26 (Fore wing membrane)	0 ⟹ 1
	34 (Hind wing)	0 ⟹ 1
Node 61 => node 49	8 (Redicula attachment)	0 ⟹ 1
Node 49=> node 48	13 (Sensilla of antennal segments)	0⟹ 1
Node 48=> node 45	32 (Discal setae under fore wing)	0 ⟹ 1
Node 45 => node 43	8 (Redicula attachment)	1 ⟹ 0
Node 43 => node 36	4 (Antennal toruli pits)	0 ⟹ 1
	10 (Scape sculpture)	0 ⟹ 1
Node 36 => node 35	16 (Pronotal setae)	0 ⟹ 1
	18 (Types of axillar setae)	0 ⟹ 1

Node 35 => node 34	6 (No. of female funicle segments)	1 ⟹ 0
Node 34 => node 33	16 (Pronotal setae) 22 (Propodeum)	1 ⟹ 0 0 ⟹ 2
Node 33 => *Acmopolynema*	32 (Discal setae under fore wing) 33 (Types of discal setae)	1 ⟹ 0 0 ⟹ 1
Node 33 => *Polynema*	18 (Types of axillar setae)	1 ⟹ 0
Node 34 => *Palaeoneura*	4 (Antennal toruli pits) 11 (Scape edges) 24 (Propodeal seta near each spiracle)	1 ⟹ 0 0 ⟹ 1 0 ⟹ 1
Node 35 => *Himopolynema*	13 (Sensilla of antennal segments)	1 ⟹ 0
Node 36 => *Stephanodes*	10 (Scape sculpture)	1 ⟹ 2
Node 43 => node 42	21 (Mesophragma) 29 (Apex of fore wing) 37 (Abdomen)	0 ⟹ 1 0 ⟹ 1 0 ⟹ 2
Node 42 => node 39	19 (Scutellum division) 37 (Abdomen)	0 ⟹ 2 2 ⟹ 3
Node 39 => *Anagrus*	20 (Shape of metanotum) 32 (Discal setae under fore wing) 41 (Type of foretibial spur)	0 ⟹ 1 1 ⟹ 0 0 ⟹ 1
Node 39 => node 38	7 (No. of claval segments) 43 (Mesophragma apex)	0 ⟹ 1 0 ⟹ 1
Node 38 => *Omyomymar*	9 (S4 sensilla on clava) 13 (Sensilla of antennal segments) 17 (Types of notuli)	1 ⟹ 0 1 ⟹ 0 1 ⟹ 2

Node 38 => node 37	10 (Scape sculpture) 29 (Apex of fore wing)	0 ⟹ 1 1 ⟹ 0
Node 37 => *Stethynium*	7 (No. of claval segments)	1 ⟹ 3
Node 37 => *Schizophragma*	43 (Mesophragma apex)	1 ⟹ 0
Node 42 => node 41	22 (Propodeum) 39 (Hypopygium)	0 ⟹ 1 0 ⟹ 1
Node 41 => node 40	10 (Scape sculpture) 41 (Type of foretibial spur)	0 ⟹ 1 0 ⟹ 1
Node 40 => *Anaphes*	7 (No. of claval segments) 32 (Discal setae under fore wing)	0 ⟹ 1 1 ⟹ 0
Node 40 => *Erythmelus*	2 (Mandible dentation) 20 (Shape of metanotum)	0 ⟹ 1 0 ⟹ 1
Node 41 => *Pseudanaphes*	7 (No. of claval segments) 29 (Apex of fore wing)	0 ⟹ 2 1 ⟹ 0
Node 45 => node 44	6 (No. of female funicle segments) 30 (Submarginal vein) 35 (Tarsi)	1 ⟹ 0 1 ⟹ 0 1 ⟹ 0
Node 44 => *Gonatocerus*	41 (Type of foretibial spur)	0 ⟹ 1
Node 44 => *Ooctonus*	14 (Pronotum carina)	0 ⟹ 1
Node 48 => node 47	41 (Type of foretibial spur)	0 ⟹ 1
Node 47 => node 46	3 (Mandibles articulation)	1 ⟹ 2

Node 46 => *Anagroidea*	16 (Pronotal setae) 18 (Types of axillar setae)	0 ⟹ 1 0 ⟹ 1
Node 46 => *Eubroncus*	2 (Mandible dentation) 10 (Scape sculpture) 38 (No. of Cercal setae)	0 ⟹ 2 0 ⟹ 1 0 ⟹ 1
Node 47 => *Cleruchus*	17 (Types of notuli) 21 (Mesophragma) 29 (Apex of fore wing) 37 (Abdomen) 40 (Gastral spiracle)	1 ⟹ 0 0 ⟹ 1 0 ⟹ 2 0 ⟹ 1 0 ⟹ 1
Node 49 => *Australomymar*	9 (S4 sensilla on clava) 16 (Pronotal setae) 28 (Marginal vein relative measurements to fore wing length)	1 ⟹ 0 0 ⟹ 2 0 ⟹ 2
Node 61 => node 60	15 (Pronotal division)	0 ⟹ 1
Node 60 => node 56	13 (Sensilla of antennal segments)	0 ⟹ 1
Node 56 => node 55	35 (Tarsi)	1 ⟹ 0
Node 55 => node 54	21 (Mesophragma) 37 (Abdomen)	0 ⟹ 1 0 ⟹ 1
Node 54 => node 50	29 (Apex of fore wing) 38 (No. of Cercal setae)	0 ⟹ 1 0 ⟹ 1
Node 50 => *Alaptus*	10 (Scape sculpture) 19 (Scutellum division) 22 (Propodeum)	0 ⟹ 1 0 ⟹ 1 0 ⟹ 1

Node 50 => *Litus*	9 (S4 sensilla on clava)	1 ⟹ 0
	13 (Sensilla of antennal segments)	1 ⟹ 0
	14 (Pronotum carina)	0 ⟹ 1
	17 (Types of notuli)	1 ⟹ 2
Node 54 => node 53	6 (No. of female funicle segments)	1 ⟹ 0
	16 (Pronotal setae)	0 ⟹ 2
Node 53 => *Callodicopus*	12 (Second funicle segments)	0 ⟹ 1
Node 53 => node 52	11 (Scape edges)	0 ⟹ 1
	19 (Scutellum division)	0 ⟹ 1
	40 (Gastral spiracle)	0 ⟹ 1
Node 52 => node 51	13 (Sensilla of antennal segments)	1 ⟹ 0
	29 (Apex of fore wing)	0 ⟹ 1
Node 51 => *Dicopus*	2 (Mandible dentation)	0 ⟹ 1
	3 (Mandibles articulation)	1 ⟹ 2
	9 (S4 sensilla on clava)	1 ⟹ 0
Node 51 => *Dicopomorpha*	38 (No. of Cercal setae)	0 ⟹ 1
Node 52 => *Kikiki*	6 (No. of female funicle segments)	0 ⟹ 2
	7 (No. of claval segments)	0 ⟹ 1
	8 (Radicula attachment with scape)	0 ⟹ 1
	28 (Marginal vein relative measurements to fore wing length)	0 ⟹ 1
	35 (Tarsi)	0 ⟹ 2
	37 (Abdomen)	1 ⟹ 0
	39 (Hypopygium)	0 ⟹ 1
Node 55 => *Arescon*	28 (Marginal vein relative measurements to fore wing length)	0 ⟹ 1
	32 (Discal setae under fore wing)	0 ⟹ 1
Node 56 => *Narayanella*	18 (Types of axillar setae)	0 ⟹ 2

	33 (Types of discal setae) 42 (Hind legs size)	0 ⟹ 1 0 ⟹ 1
Node 60 => node 59	38 (No. of Cercal) 40 (Gastral spiracle)	0 ⟹ 1 0 ⟹ 1
Node 59 => node 58	6 (No. of female funicle segments)	1 ⟹ 0
Node 58 => node 57	10 (Scape sculpture) 12 (Second funicle segments) 35 (Tarsi)	0 ⟹ 1 0 ⟹ 1 0 ⟹ 1
Node 57 => *Camptoptera*	2 (Mandible dentation) 11 (Scape edges) 14 (Pronotum carina) 17 (Types of notuli) 29 (Apex of fore wing) 31 (Macrocheta and hypocheta)	0 ⟹ 1 0 ⟹ 1 0 ⟹ 1 1 ⟹ 3 0 ⟹ 2 0 ⟹ 1
Node 57 => *Camptopteroides*	8 (Radicula attachment with scape) 13 (Sensilla of antennal segments)	0 ⟹ 1 0 ⟹ 1
Node 58 => *Ptilomymar*	15 (Pronotal division) 24 (Propodeal seta near each spiracle) 25 (Propodeum with membranous-leaf like expansion)	1 ⟹ 0 0 ⟹ 2 0 ⟹ 1
Node 59 => *Eofoersteria*	14 (Pronotum carina) 29 (Apex of fore wing) 31 (Macrocheta and hypocheta)	0 ⟹ 1 0 ⟹ 2 0 ⟹ 1
Node 62 => *Mymar*	14 (Pronotum carina) 16 (Pronotal setae)	0 ⟹ 1 0 ⟹ 1

Tree (description)

Tree indicating the relationships among the genera of the family Mymaridae (Fig.1). Tree is given by PAUP and further hypothesis is given in terms of data matrix. The nodes numbers of the tree start from 62–33 and each node ends by the name of a terminal taxon. Every node indicates its character state changes by 2 or 3-digit numbers and a '-'between character number and state changes. For example, on node 49 to node 48, the number 13-1 indicates character number by 13 and state change by 1. Only unambiguous characters state changes were used for optimization of relationships on tree (Table 2).

Tree shows hypothesis according to the data matrix, 100 random stepwise heuristic searches with number of steps required for perfect fit is 1550176. All characters are of type 'unordered'. All characters have equal weight and 8 characters are parsimony-uninformative.

Number of parsimony-informative characters = 35

Tree length = 140

Consistency index (CI) = 0.4357

Homoplasy index (HI) = 0.5643

Retention index (RI) = 0.5635

As the synthesis of present morphological data genus *Mymaromma* Girault, considered as sister group of Mymaridae, hence share several characters but 10 evolutionary entities are unique and considered as most primitive in outgroup consideration. They are as follows: 1. Head capsule (Gibson, 1986a; Fig. 9, Gibson *et al.* 2007; Fig. 42); 2. Mandible articulation (Gibson, 1986a; Fig. 7& 8; Gibson *et al.*, 2007; Fig. 43& 44); 3. Separation of toruli (Gibson *et al.*, 2007; Fig. 43); 4. S4 sensilla on clava (Gibson, 1986a; Fig. 80; Gibson *et al.*, 2007, Fig. 58); 5. Types of notuli (Gibson *et al.*, 2007; Fig. 78, 79, 80, 82); 6. Propodeal flange (Gibson, 1986a; Fig. 80); 7. Fore wing membrane covering pattern (Gibson, 1986a; Fig. 30; Gibson *et al.*, 2007; Fig. 113–116); 8. Submarginal vein parallel to margin of fore wing (Gibson *et al.*, 2007; Fig. 127, 132); 9. Tarsi 5-segmented; 10. Petiole segmentation (Gibson *et al.*, 2007; Fig. 88, 89).

As the genus *Mymaromma* an outgroup so the node 62 leading to outgroup and terminate to *Mymar*, the characters state change occurs from *Mymar* to node 62

by only two character states, i.e. presence of pronotum carina (14-1) and presence of long and modified pronotal setae (16-1).

Node 62 leads to node 61 on the basis of two character state changes (26-1& 34-1), node 61 to node 49 (8-1), node 49 to node 48 (13-1), node 48 to 45 (32-1) and node 45 to node 43 (8-0) by one character state change each. Similarly node 36 to node 35 (16-1, 18-1) and node 34 to 33 (16-0, 22-2) by two character state changes each.

Genus *Acmopolynema* and genus *Polynema* have placed as terminal taxon on node 33, *Acmopolynema* shows two character state changes (32-0, 33-1) and *Polynema* differ from *Acmopolynema* by only one character state change (18-0). *Palaeoneura* on node 34 running single by absence of toruli pits, scape edges not smooth with setaceous 1-2 teeth and presence of two propodeal seta near each spiracle similarly on node 35 ends with the genus *Himopolynema* by only one character change (13-0). On node 36 genus *Stephanodes* ends as a terminal taxon on the basis of rasp-like sculpture. All these taxon are monophyletic and related with *Polynema* group of genera.

There were three character state changes (21-1, 29-1 & 37-2) from node 43 to node 42. On the basis of posterior scutellum division; partially or completely divided by a longitudinal sulcus into two lobes and abdomen subsessile type 2, node 42 leads to node 39 which includes *Anagrus* group of genera namely, *Anagrus, Omyomymar*, *Schizophragma* and *Stethynium*. Genus *Anagrus* placed as terminal taxa on node 39 by four character states changes (20-1, 32-0 & 41-1) and genus *Omyomymar* leading on node 38 by presence of S4 sensilla on clava, and node 37 on the basis of presence of scape sculpture and apex of forewing straight leading to genus *Stethynium* differ by 3-segmented clava and genus *Schizophragma* differ by notched mesophragma apex.

In third group, starting from node 42 contains *Anaphes group* of genera, viz. *Anaphes, Erythmelus* and *Pseudanaphes*. Node 40 leads to *Anaphes* by two characters state changes (7-2 & 32-0) and terminates to *Erythmelus* also by two characters state changes (2-1 & 20-1), genus *Pseudanaphes* running isolated from node 41 also by two character state changes i.e. 3-segmented clava and apex of fore wing straight.

Alternate to above three groups of genera, genera *Gonatocerus* and *Ooctonus* shows character state changes from 14-1 to 14-0 and 41-0 to 41-1 on the basis of 7–8-segmented funicle segment, submarginal vien parallel to margin of fore wing or usually bending upwards and 5-segmented tarsi.

On the basis of antennal radicula clearly separated from scape leading to node 49, 47 & 46 forming a group consist of four genera. There are three groupings of four genera mainly *Anagroidea* and *Eubronchus* defined by the presence of long and modified pronotal and axillar setae in *Anagroidea* and mainly having mandibles with variety of teeth in *Eubroncus,* these two genera belongs to *Anagroidea* group of genera; genus *Cleruchus* represents *Cleruchus* group of genera shows closeness with node 47 genera by absence of notuli, mesophragma well developed, apex of fore wing curving downwards, abdomen subsessile and absence gastral spiracle, but the genus *Australomymar* terminates from node 49 mainly by marginal vein less than equal to half of fore wing length, presence of S4 sensilla on clava and absence of pronotal setae.

The second large group of 6 genera namely, *Alaptus*, *Litus*, *Callodicopus*, *Dicopus*, *Dicopomorpha* and *Kikiki* basically known as *Camptoptera-group* of genera emerged from node 54 on the basis of common three characters state changes (mesophragma well developed or projecting into gaster and abdomen subsessile). From node 50 terminal taxon *Alaptus* defined by three character changes.(10-1, 19-1 & 20-1) and other alternate running taxon *Litus* differ mainly by presence of S4 sensilla on clava and by some other characters state changes (13-0, 14-1 & 17-2). On node 53, on the basis of second funicle segment either ring-like or occasionally not ring-like defined the genus *Callodicopus.* From node 51 arise two genera, *Dicopus* by three characters state changes (2-1, 3-2 & 9-0) and *Dicopomorpha* only by one character state changes (38-1). Opposite to node 51 a single running genus *Kikiki* by seven character state changes (6-2, 7-1, 8-1, 28-1, 35-2, 37-0 & 39-1).

Genera *Arescon* and *Narayanella* both terminate single from node 55 by two character state changes (28-1& 32-1) and from node 56 by three character state changes (18-2, 33-1 & 42-1) respectively.

Genus *Camptoptera* and *Camptopteroides* on node 57 show close relationship but differ each other on the basis of some characters state changes i.e. 2-1, 11-1, 14-1, 17-3, 29-2 & 31-1 in *Camptoptera* and 8-1, 13-1 in *Camptopteroides.*

Genus *Ptilomymar* terminates singly from node 58 by having completely or partially divided pronotum, by a longitudinal suture, propodeal setae branched and propodeum with membranous-leaf like expansion. Similarly genus *Eofoersteria* running singly from node 59 on the basis of three characters state changes, pronotum with transverse carinae, apex of fore wing curving downwards and macrocheta and hypocheta reduced or difficult to see.

Discussion

The above phylogenetic analysis should be considered as preliminary based on all Indian genera and only female morphological characters were analyzed. On the basis of above groups of genera a hypothesis of relationships of these Indian genera shown in Fig.1 and it is concluded that basically there are 11 groups of genera arise from the present study as follows: *Polynema* group, *Anagrus* group, *Anaphes* group, *Gonatocerus* group, *Ooctonus* group *Anagroidea* group, *Cleruchus* group, *Australomymar* group, *Alaptus* group, *Arescon* group and *Camptoptera* group. The analysis supports classification of the family mymaridae into different generic groups by Lin. *et al.* (2007), but position of some genera was found uncertain according to present study e.g. genus *Cleruchus* placed in a separate group by Lin. *et al.* (2007) but it shows some relationship with *Anagroidea* and *Eubroncus* also on the basis of long and bifurcate foretibial spur. Similarly genus *Arescon* also shows some relationships with *Camptoptera* group of genera by having 5-segmented tarsi. But the actual position of these genera in Indian context would more understandable when other members of these groups of genera found from India in future.

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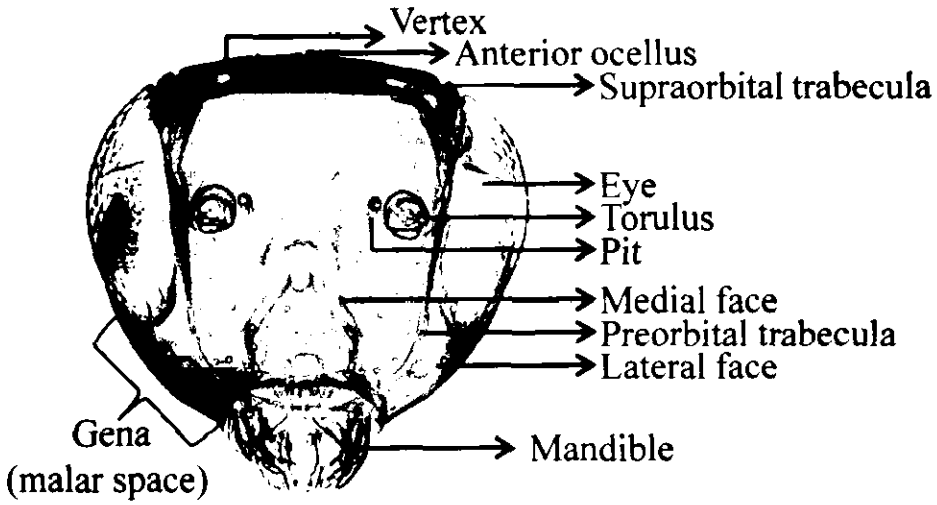

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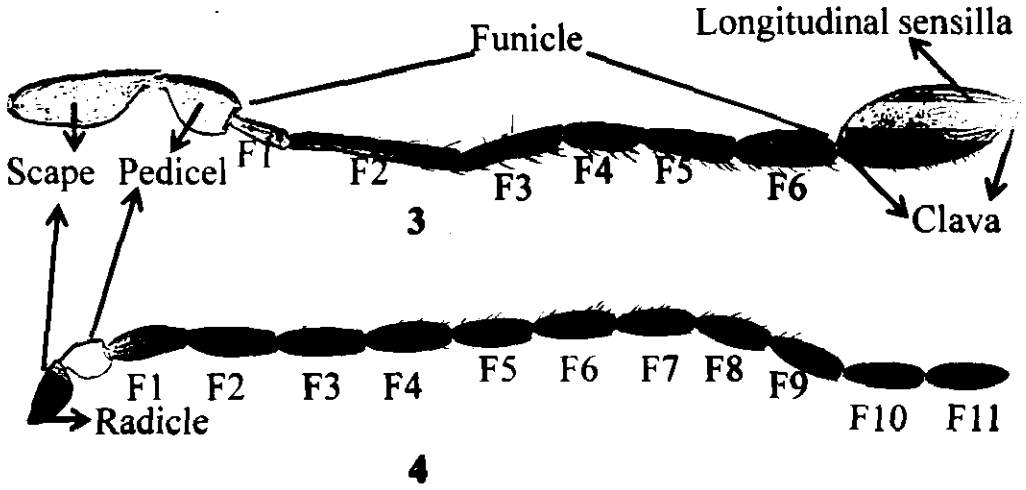
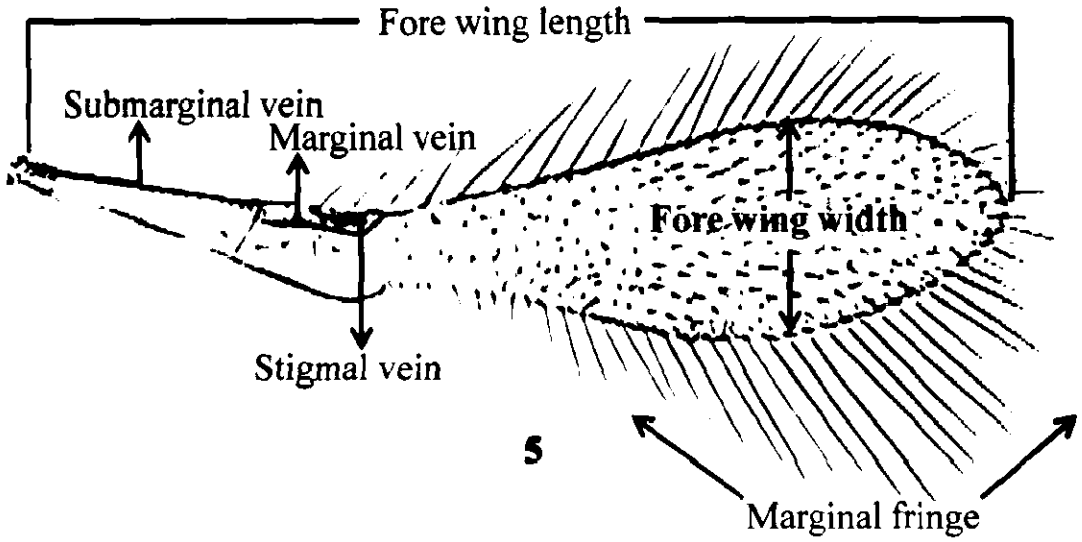
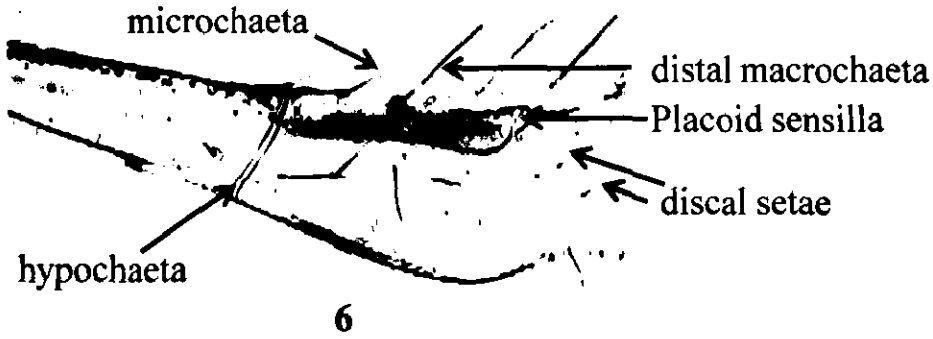
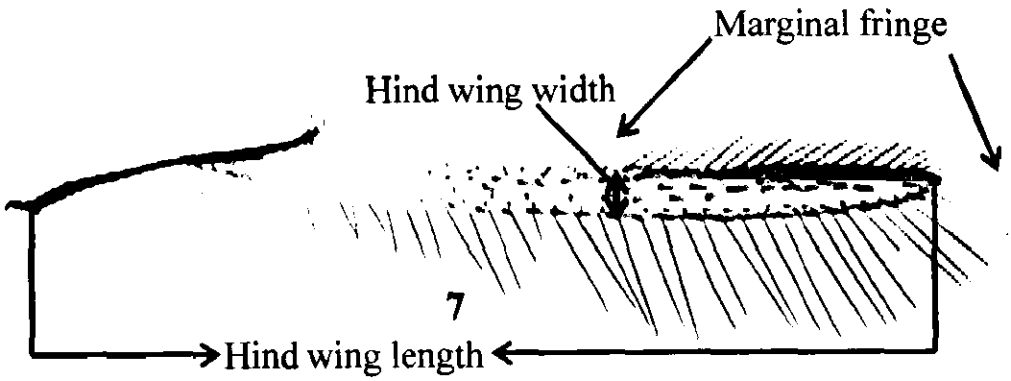


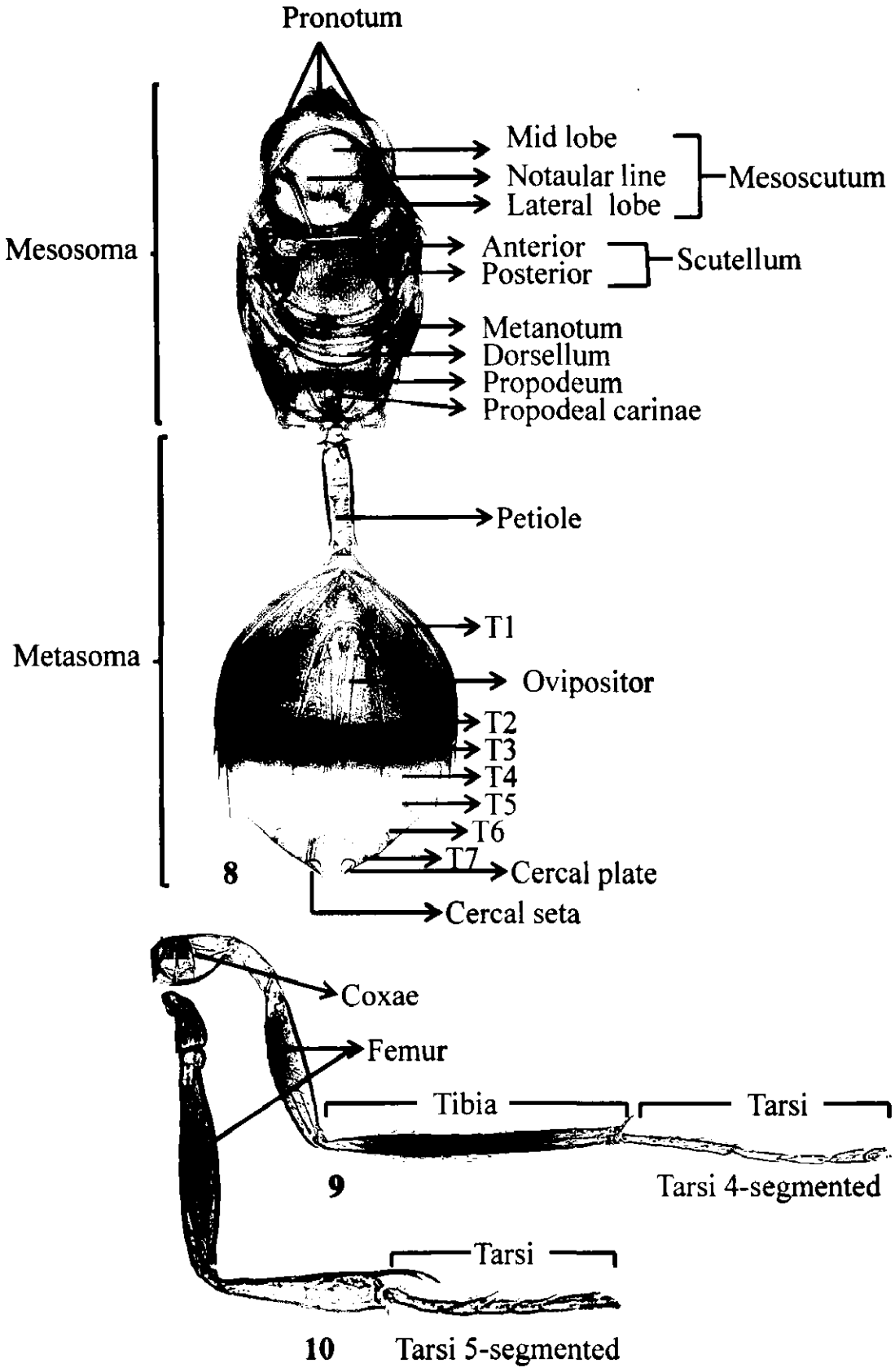
Figures 2–4. Explanation of terminology. *Polynema dunense* Hayat & Anis. (Fig. 2, 3) Female: 2, head, dorsal; 3, antenna; *Polynema brevicarinae* Annecke & Doutt, (Fig. 4) Male: 4, antenna.



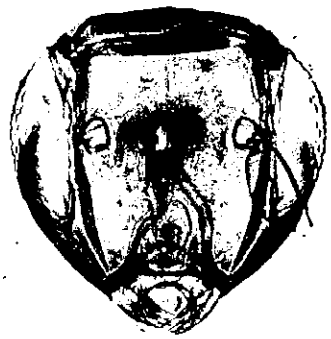




Figures.5–7. Explanation of terminology. *Stethynium empoascae* Subba Rao. Female: 5, Fore wing; 6, Fore wing, basal part enlarged; 7, Hind wing.



Figures 8–10. Explanation of terminology. *Polynema bicolorigastra* sp. nov. (Fig. 8–9) Female (Holotype): 8, mesosoma and metasoma, dorsal; 9, hind leg; *Litus assamensis* sp. nov. (Fig. 10) Female: 10, fore leg.



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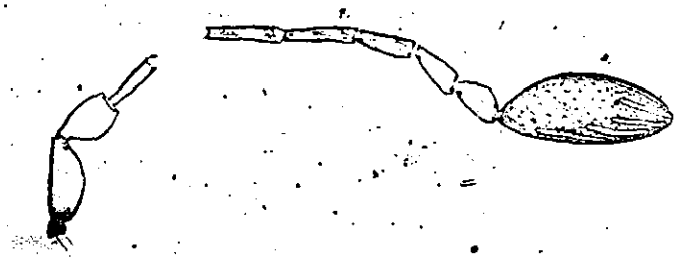

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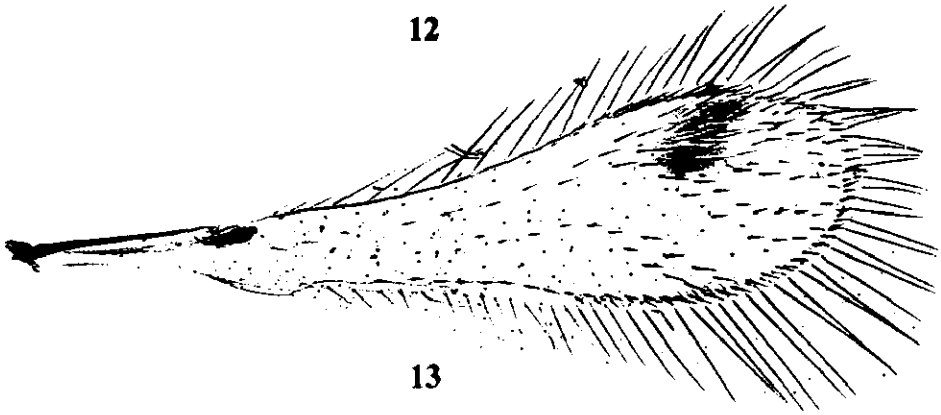

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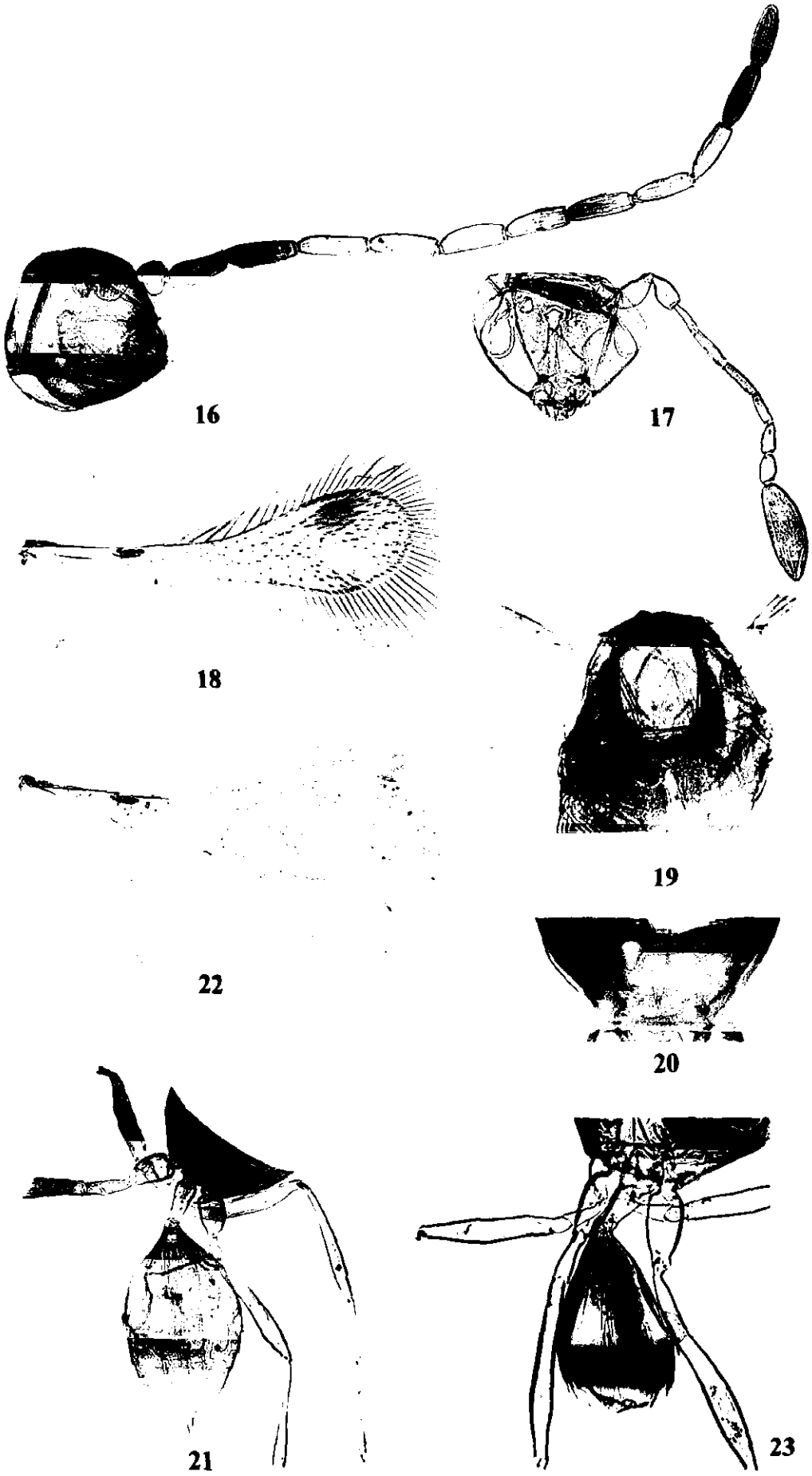
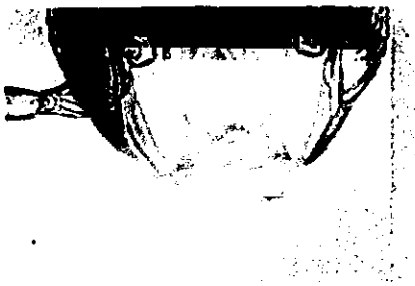
Figures 11–15. *Acmopolynema indochinense* (Soyka). Female: 11, head; 12, antenna; 13, fore wing; 14, mesosoma, dorsal; 15, metasoma showing ovipositor.



Figures 16–23. *Acmopolynema bimaculatum* Subba Rao. Female: 17, head with antenna, frontal; 18; fore wing; 19, mesoscutum; 20, propodeal carinae; 21, metasoma showing ovipositor. Male: 16, head with antenna, frontal; 22, fore wing; 23, metasoma showing genitalia.



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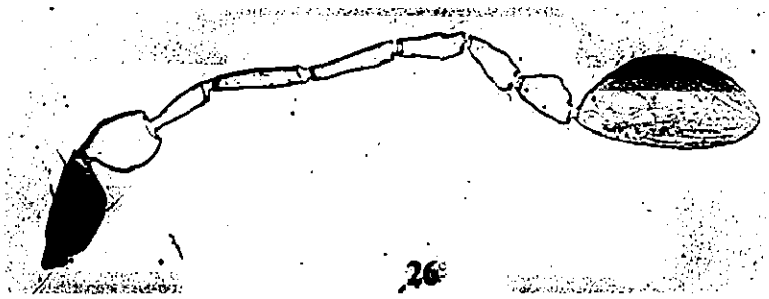

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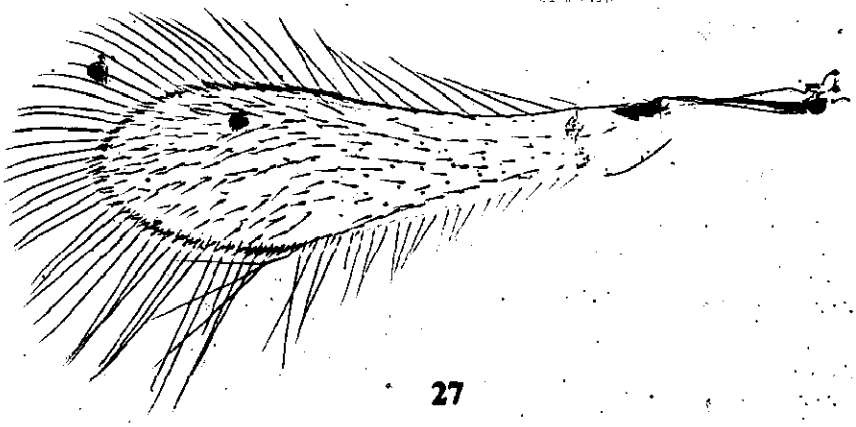

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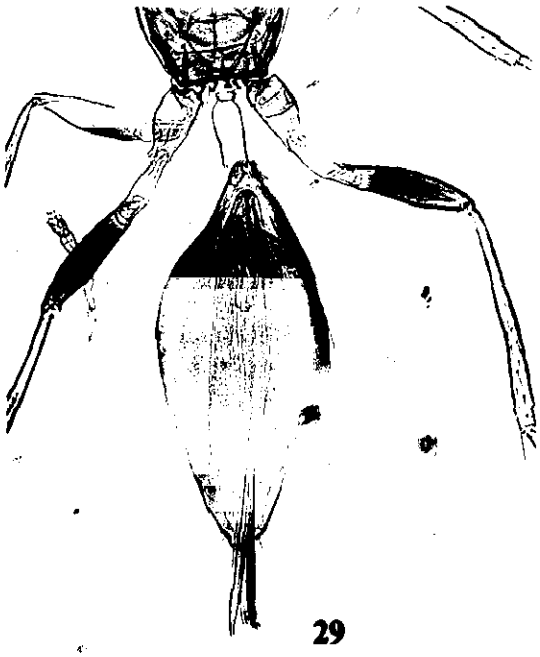

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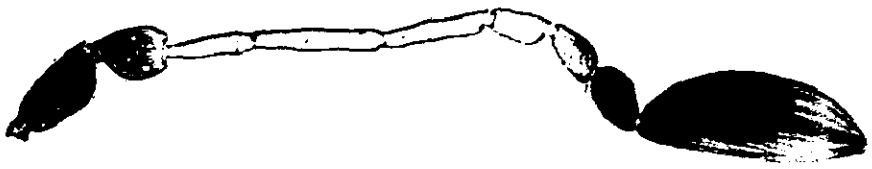
Figures 24–29. *Acmopolynema shrawastianum* Hayat & Anis. Female: 24, head frontal; 25, mandibles 26, antenna; 27, fore wing; 28, mesosoma, dorsal; 29, metasoma showing ovipositor.



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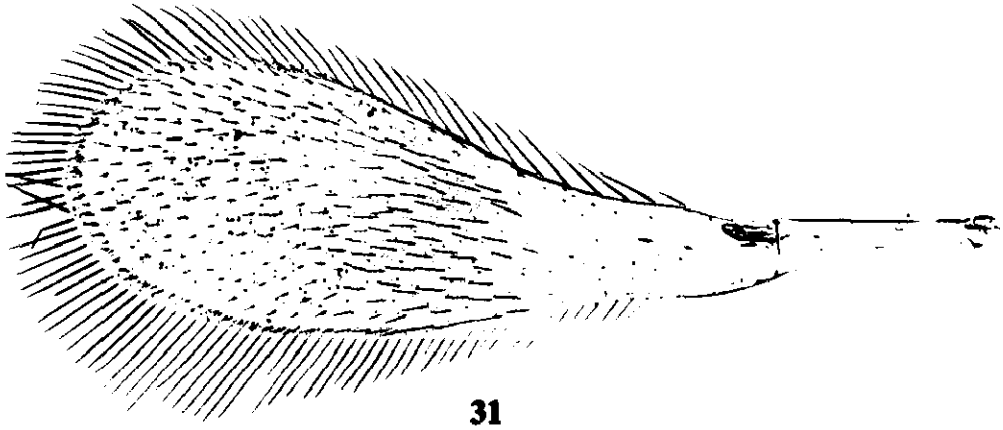

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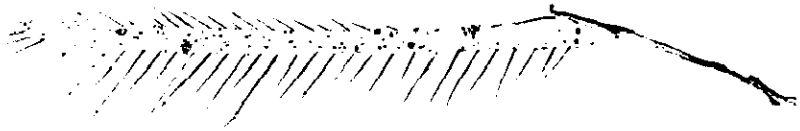

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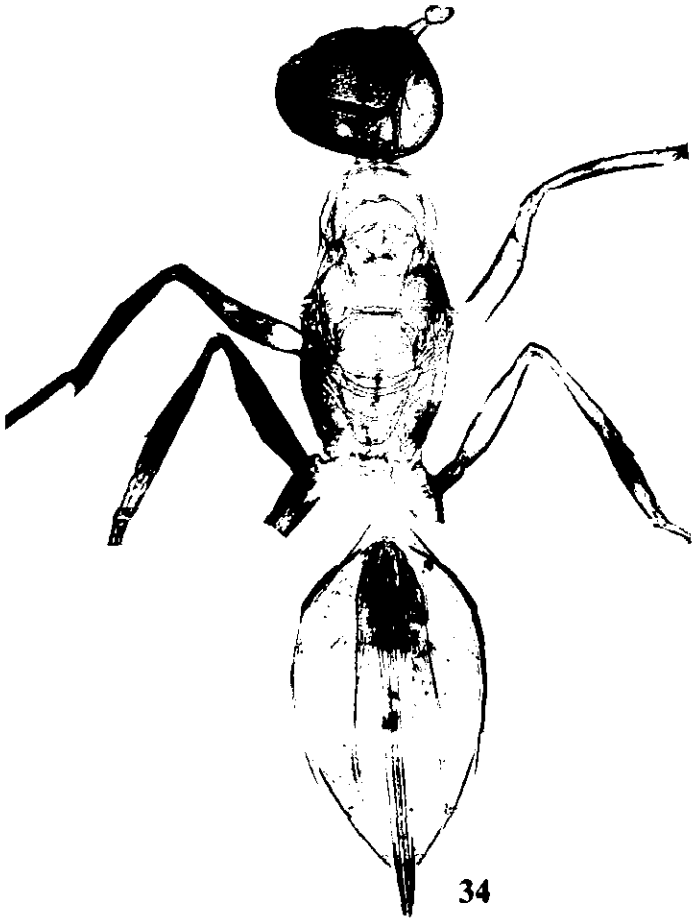

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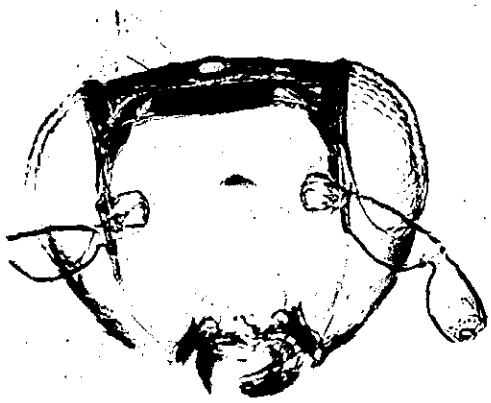
Figures 30–34. *Acmopolynema incognitum* (Narayanan *et al.*). Female: 30, antenna; 31, fore wing; 32, hind wing; 33, propodeum showing carinae; 34, mesosoma and metasoma, dorsal.



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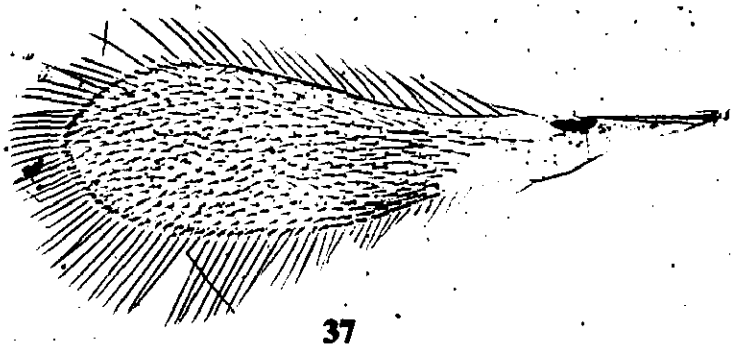

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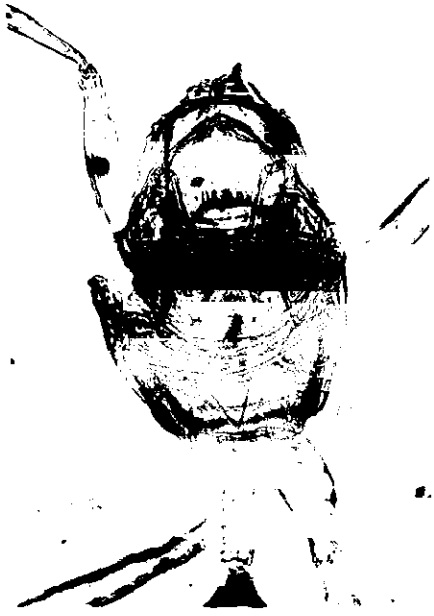

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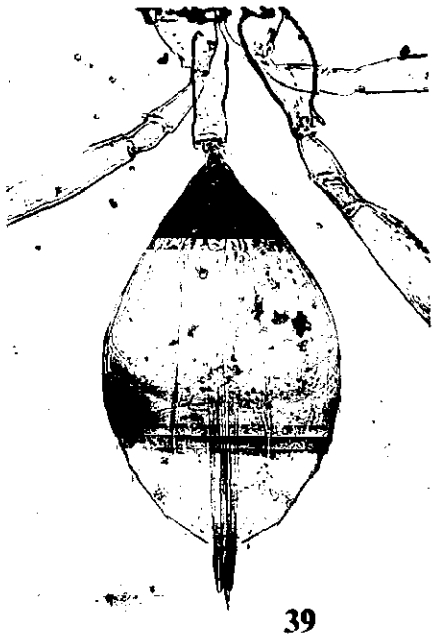

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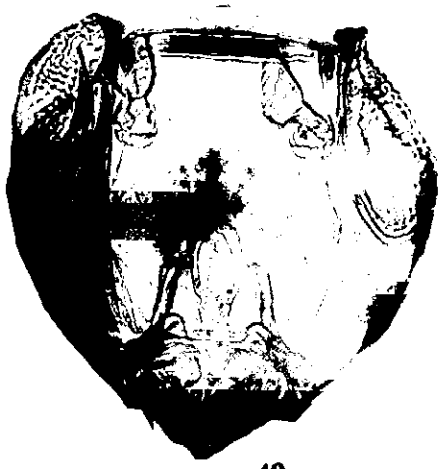
Figures 35–39. *Acmopolynema problema* Triapitsyn & Berezovskiy. Female: 35,head frontal; 36, antenna; 37 fore wing; 38, mesosoma showing propodeal carinae; 39, metasoma showing ovipositor.



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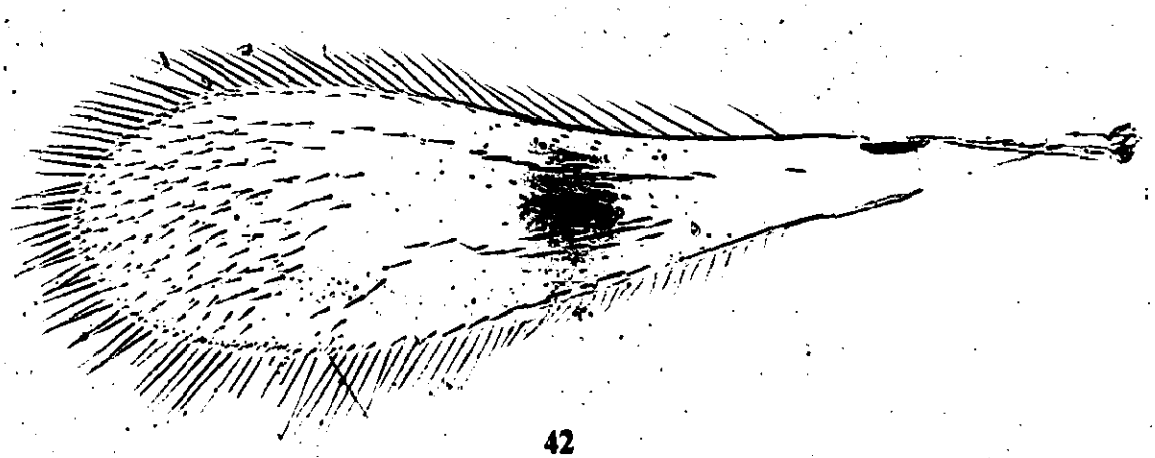

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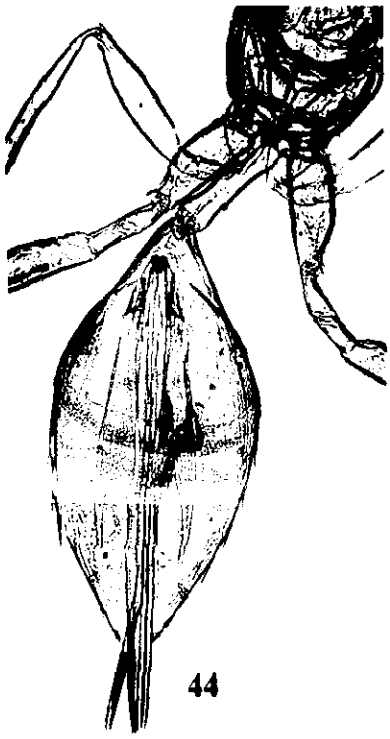

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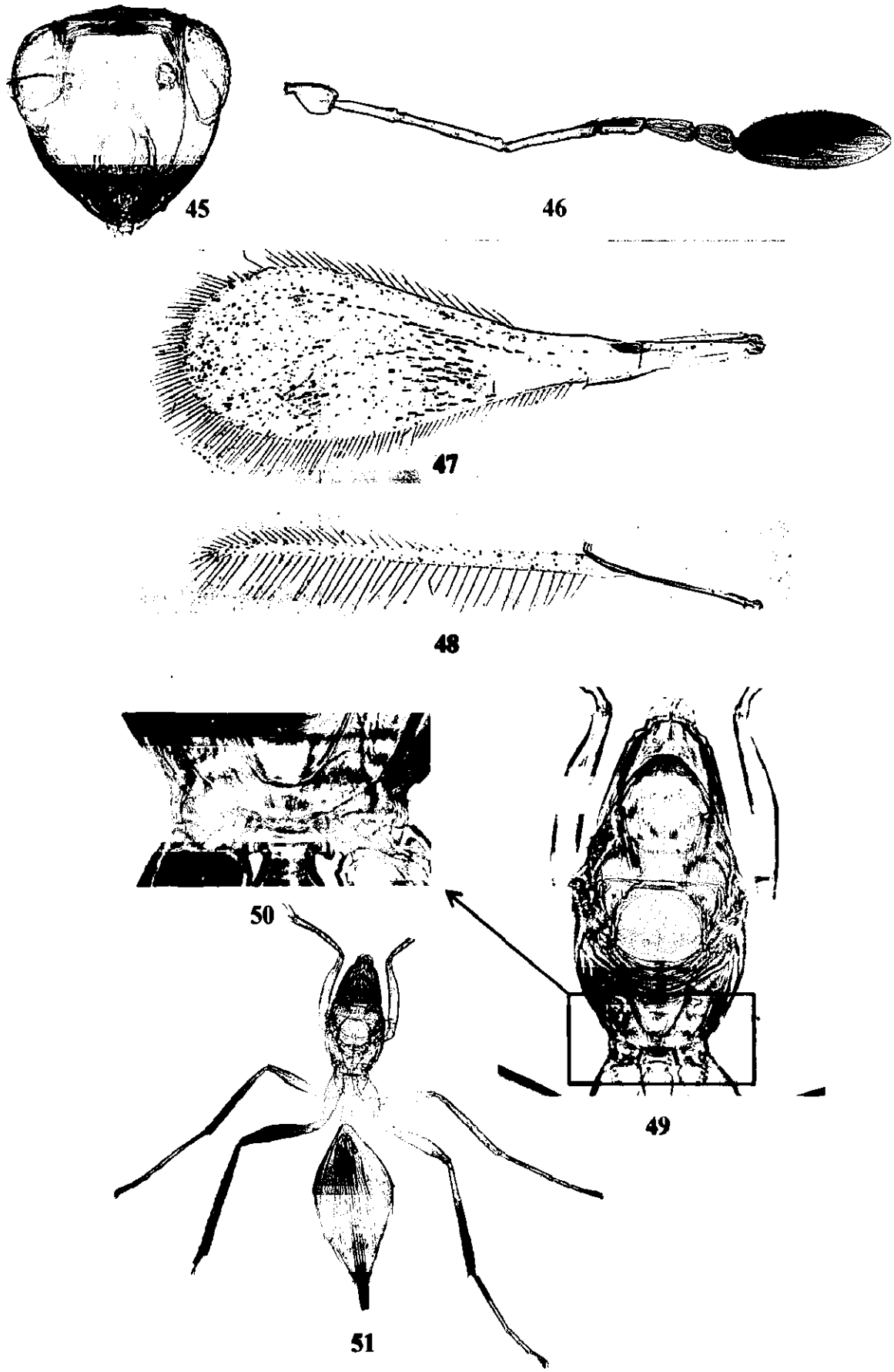
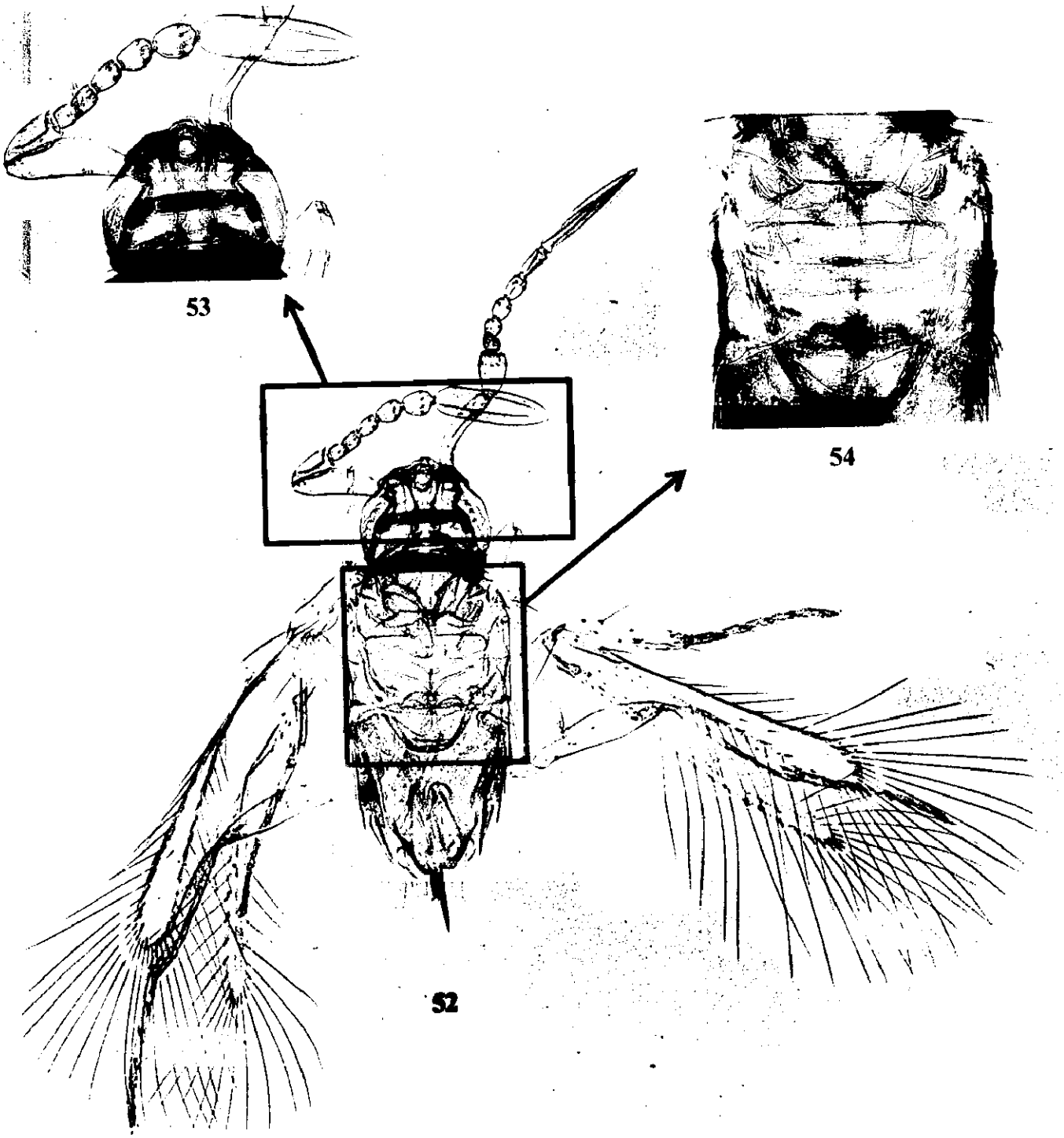
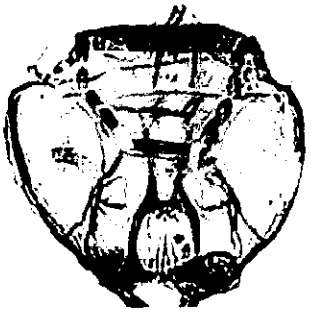
Figures 40–44. *Acmopolynema campylurum* Xu & Lin. Female: 40, head frontal; 41; antenna; 42, fore wing; 43, mesosoma, showing propodeal division; 44, metasoma showing ovipositor.

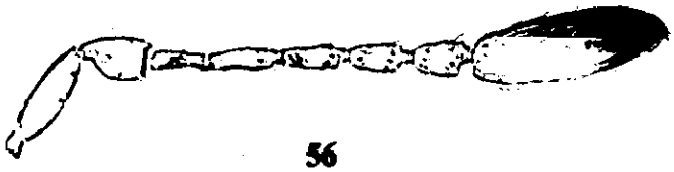


Figures 45–51. *Acmopolynema orientale* (Narayanan, Subba Rao & Kaur). Female: 45, head frontal; 46; antenna; 47, fore wing; 48, hind wing; 49, mesosoma; 50, propodeal carinae; 51, mesosoma and metasoma, dorsal.



Figures 52–54. *Alaptus macrurus* sp. nov. Female (Holotype): 52, body, dorsal; 53, mesosoma; 54, head and antenna.





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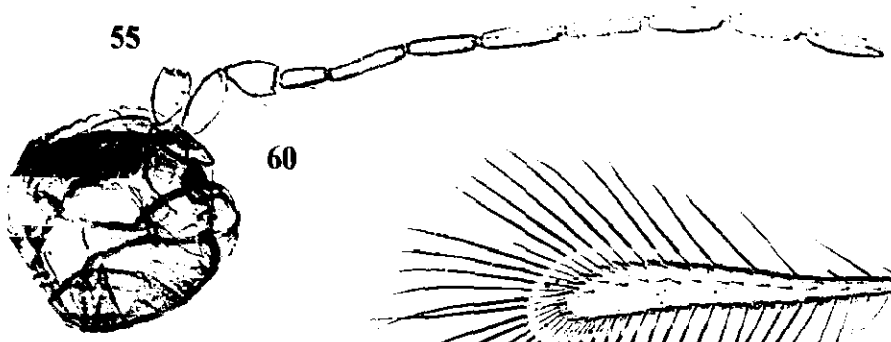

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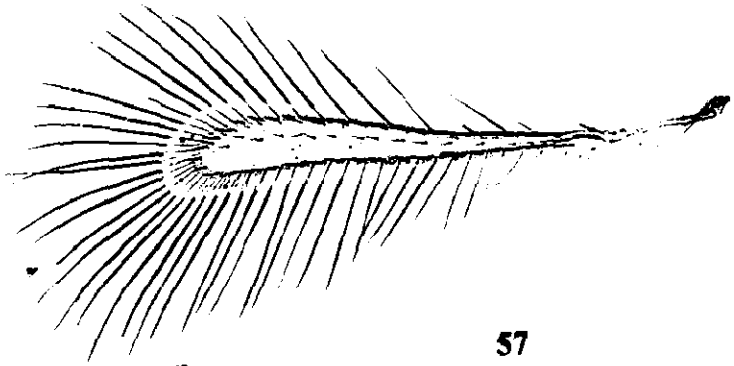

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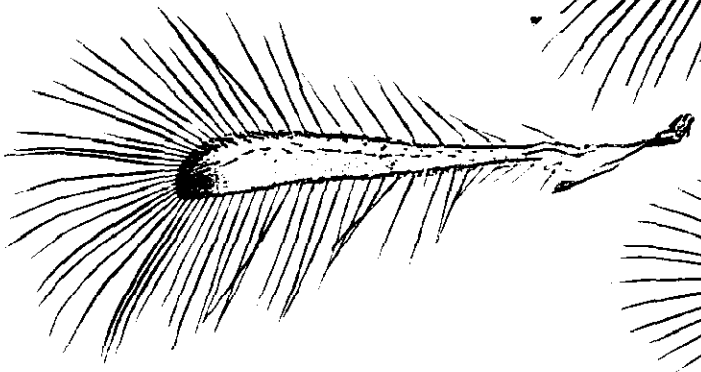

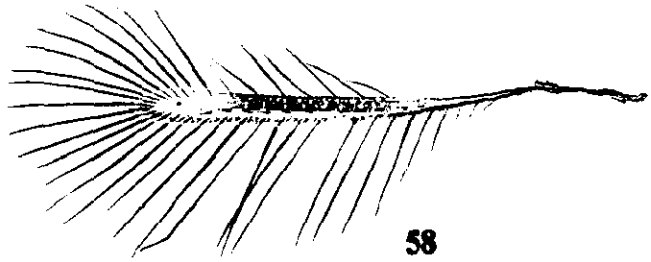

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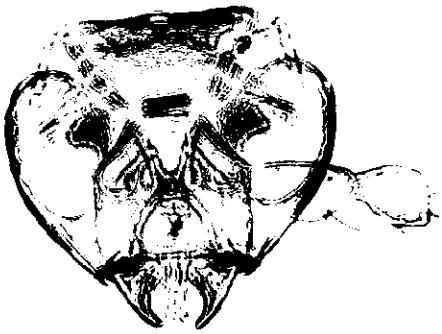
Figures 55–62. *Alaptus deccanensis* Anwar & Zeya. Female: 55, head frontal; 56, antenna; 57, fore wing; 58, hind wing; 59, mesosoma and metasoma, dorsal. Male: 60, antenna; 61, fore wing; 62, metasoma showing genitalia.



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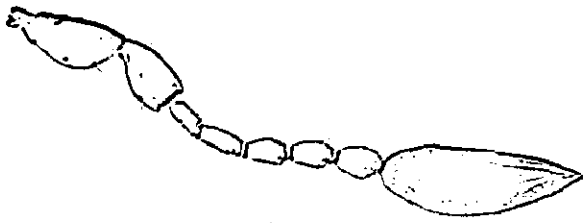

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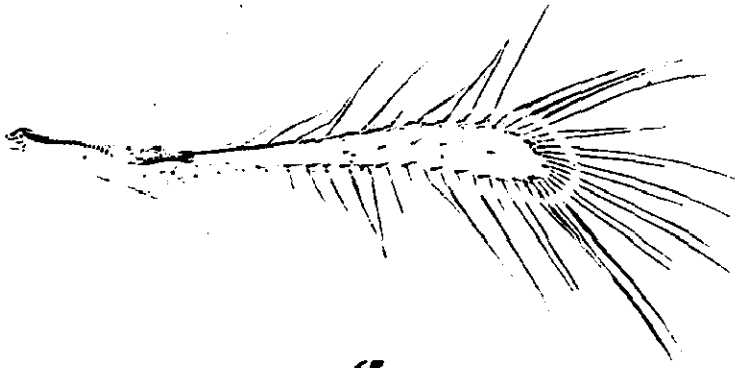

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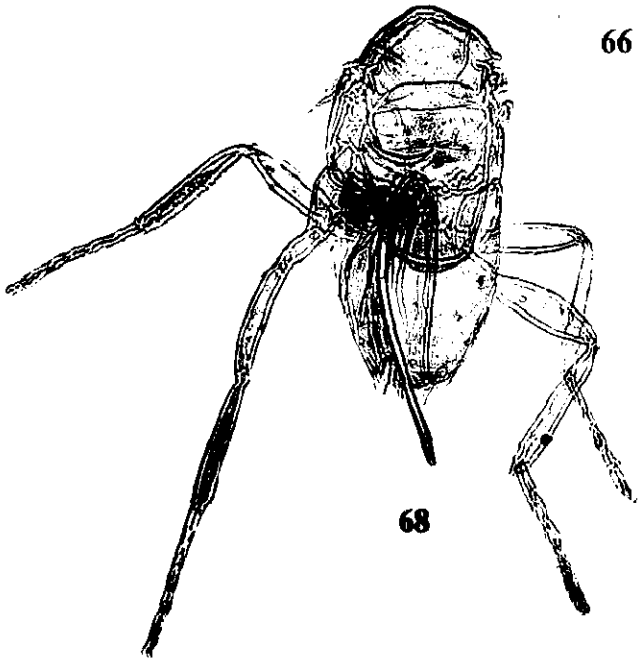

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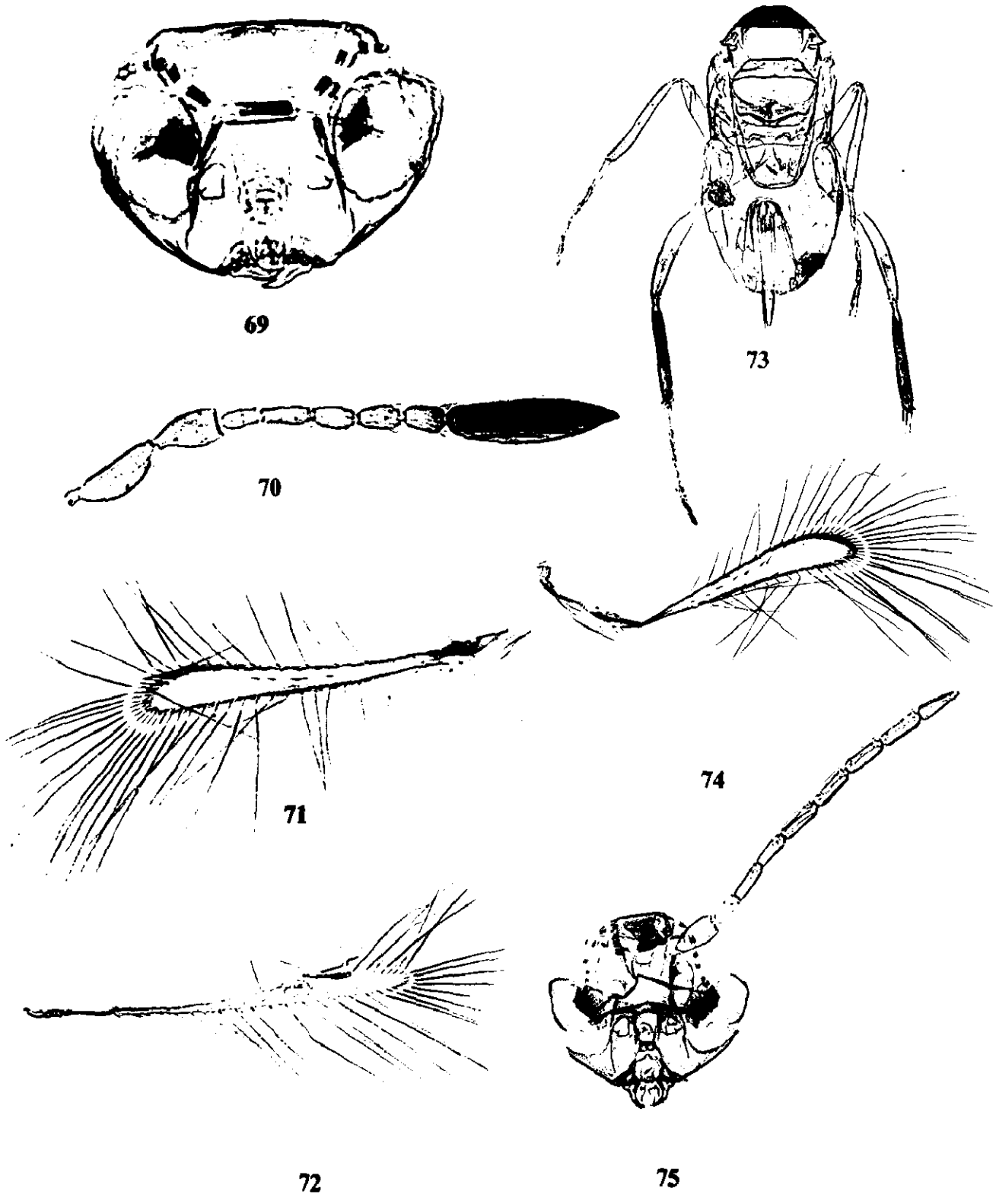
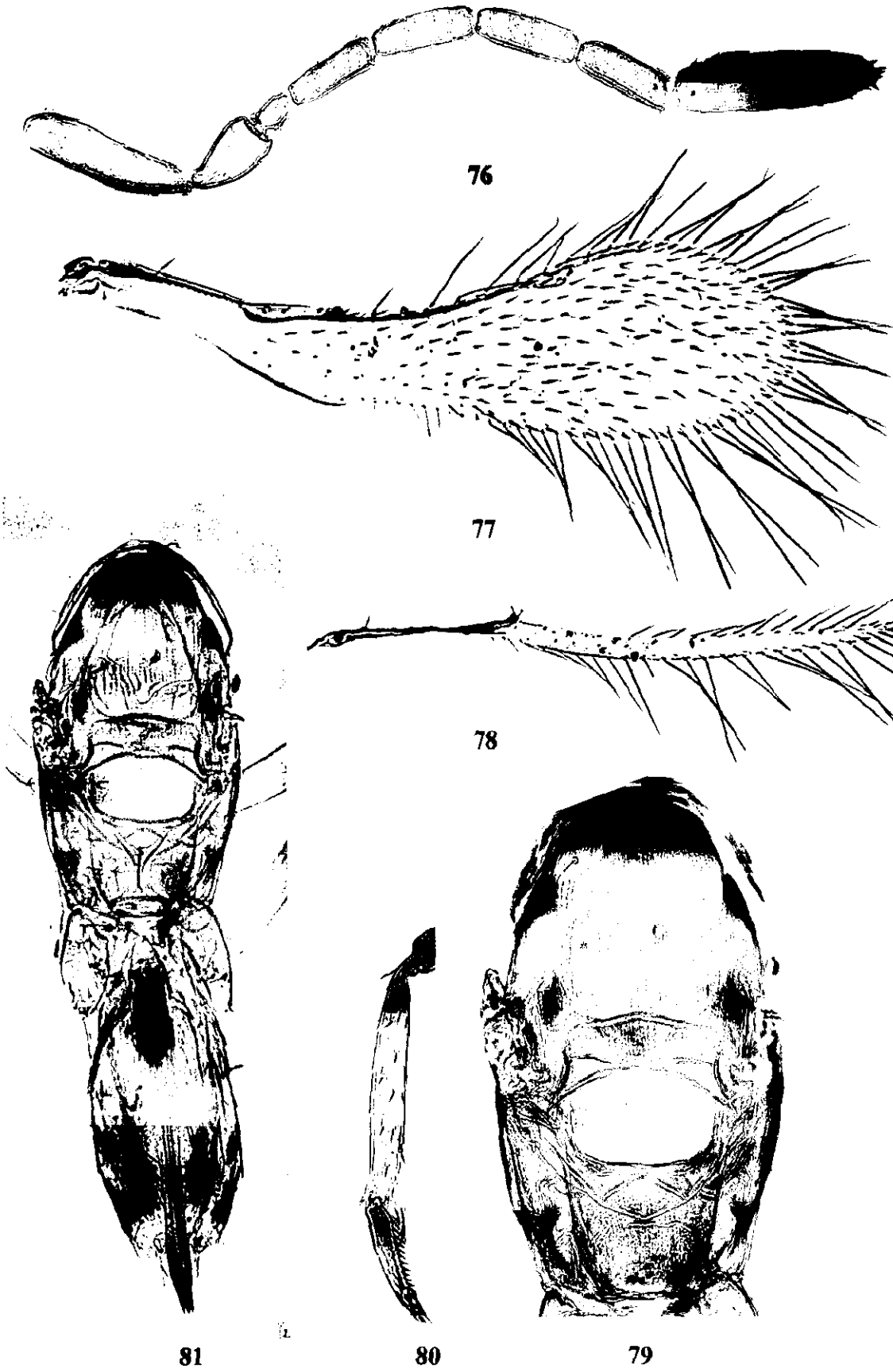
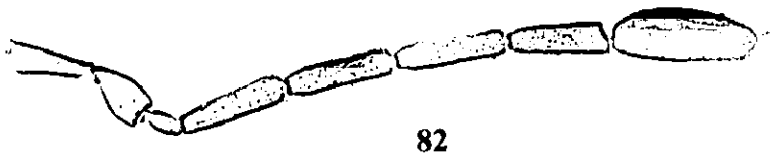
Figures 63–68. *Alaptus ramamurthyi* Anwar & Zeya. Female: 63, head frontal; 64, antenna; 65, fore wing; 66, hind wing; 67, mesosoma; 68, mesosoma and metasoma, dorsal.



Figures 69–75. *Alaptus jowainus* Rehmat & Anis. Female: 69, head frontal; 70, antenna; 71, fore wing; 72, hind wing; 73, mesosoma and metasoma, dorsal; Male: 74, head with antenna; 75, fore wing.



Figures 76–81 *Arescon enocki* Subba Rao & Kaur. Female: 76, antenna; 77, fore wing; 78, hind wing; 79, mesosoma, dorsal; 80, fore tibia showing peg-like sensillae; 81, mesosoma and mestasoma, dorsal.



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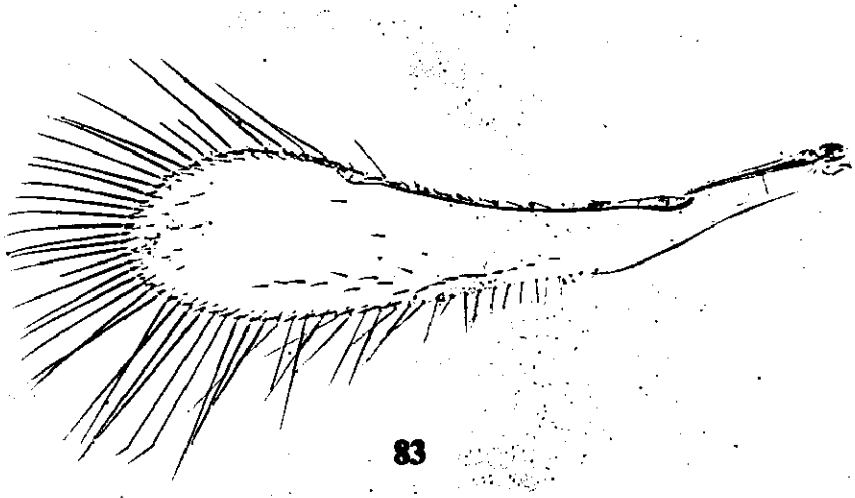

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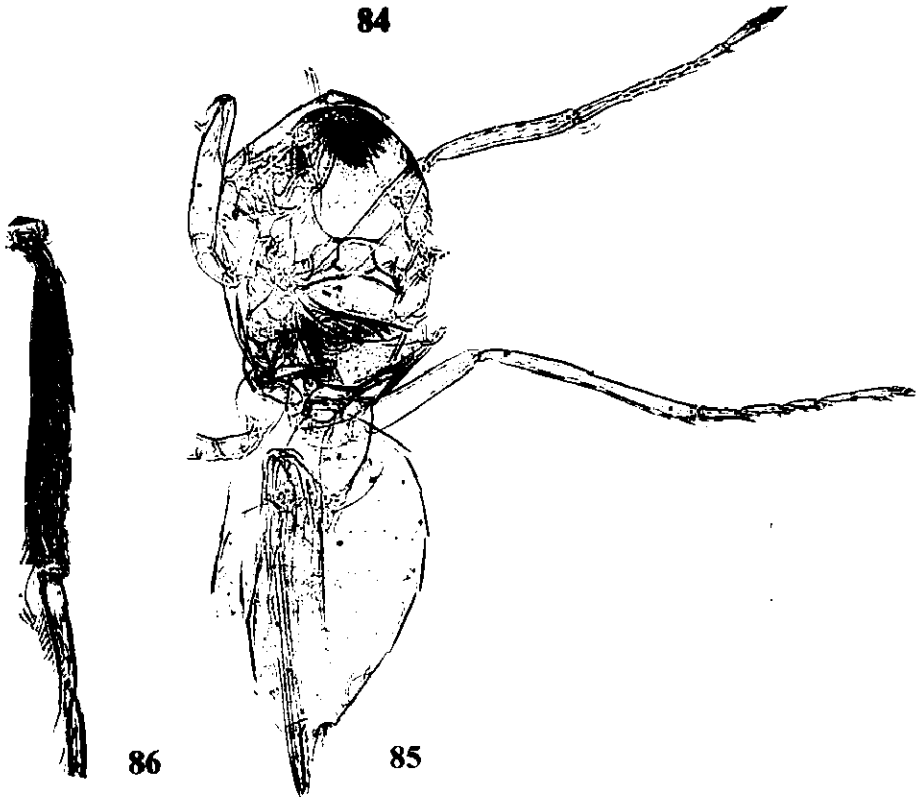

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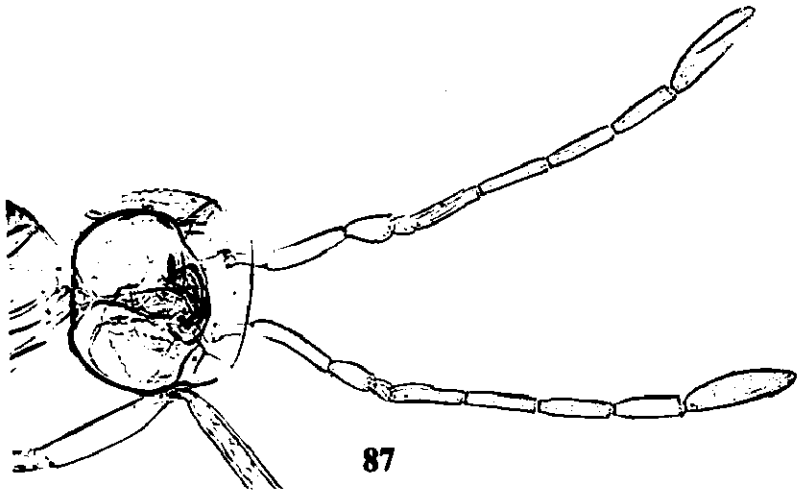
Figures 82–86 *Arescon meghalayaensis* sp. nov. Female (Holotype): 82, antenna; 83, fore wing, 84, hind wing; 85, mesosoma and metasoma, dorsal; 86, fore tibia.



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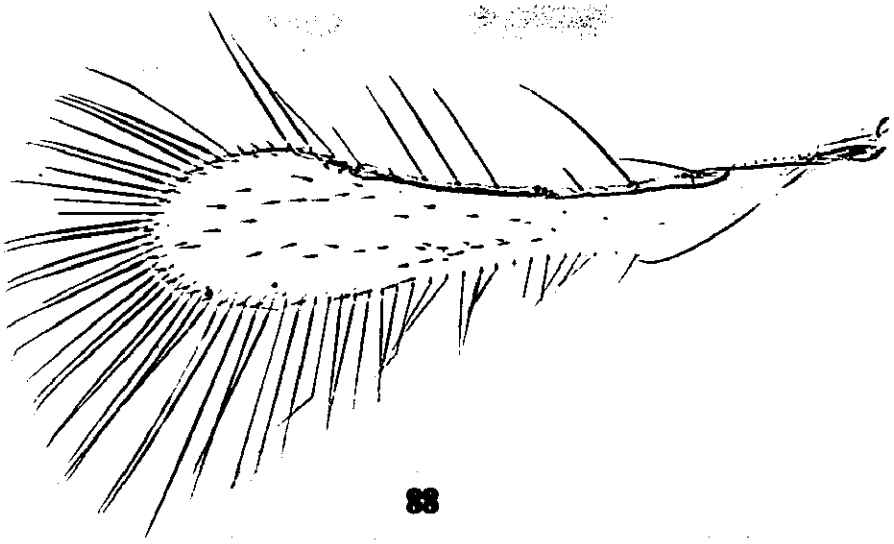

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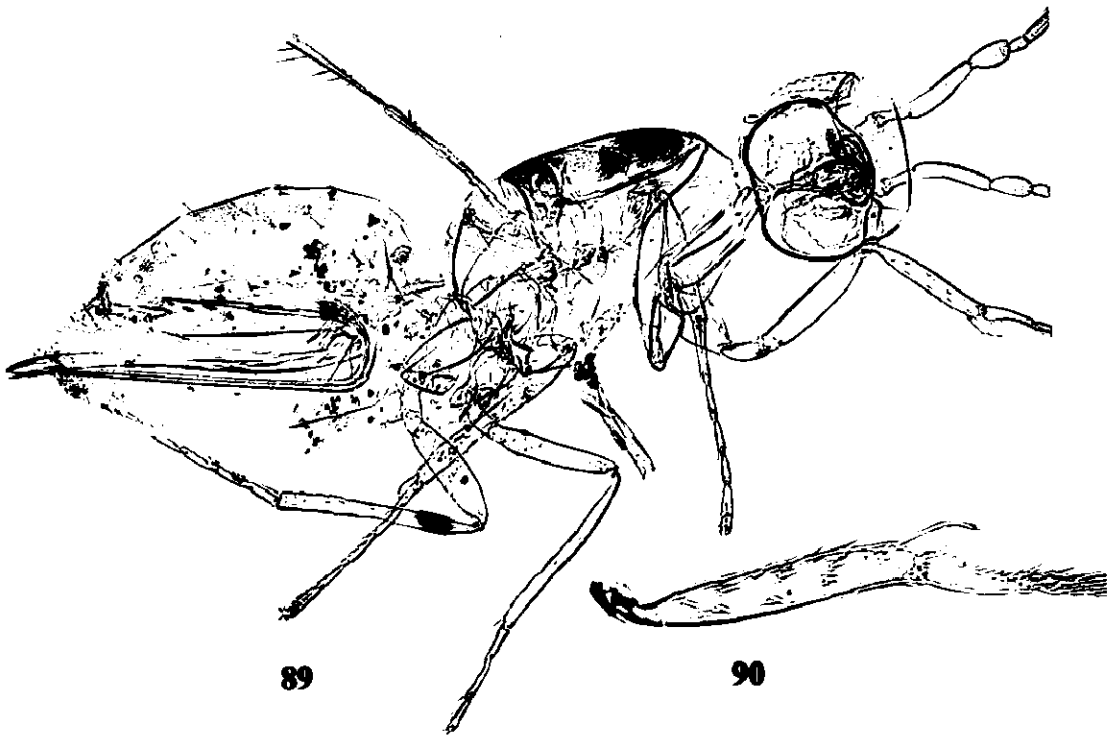
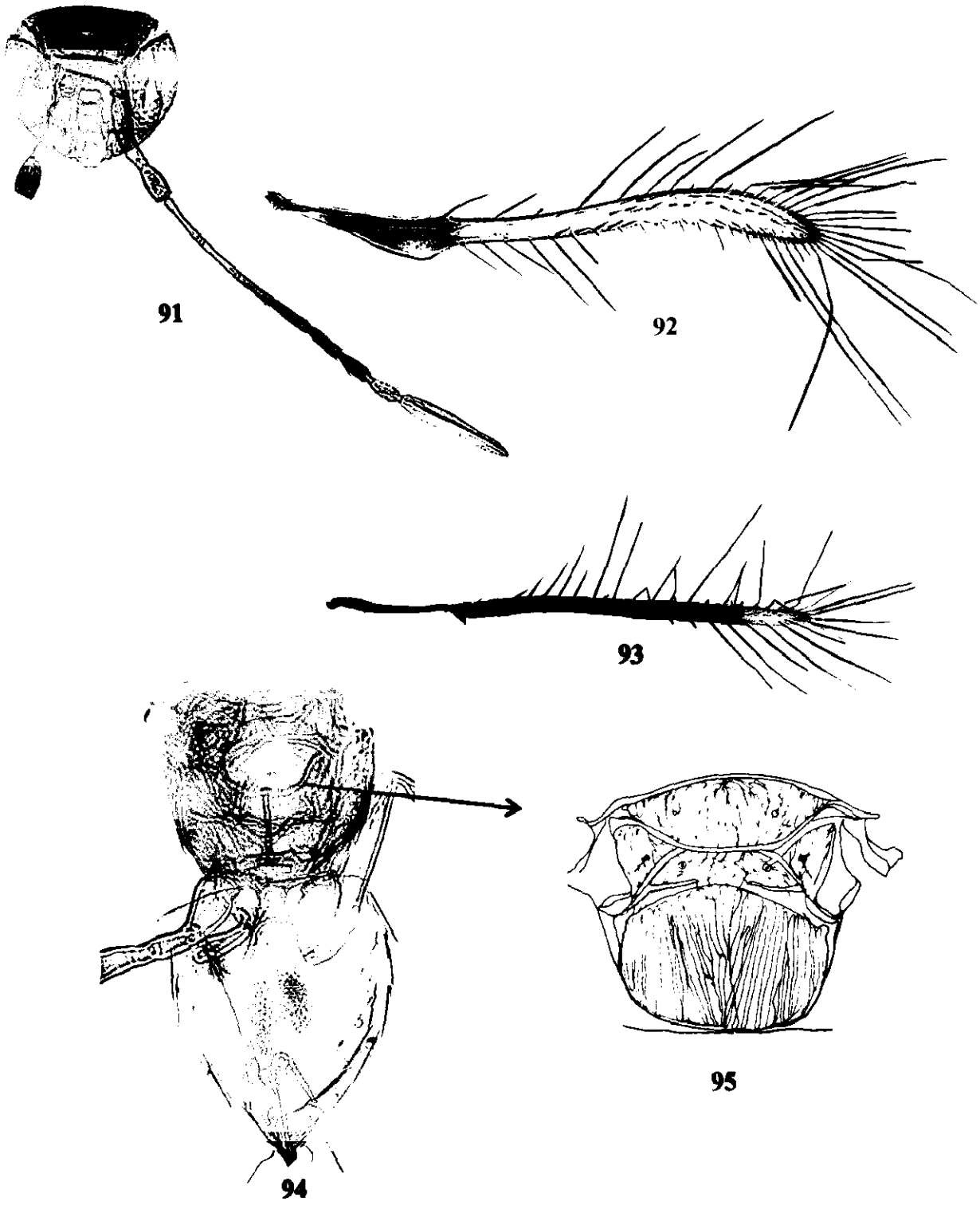
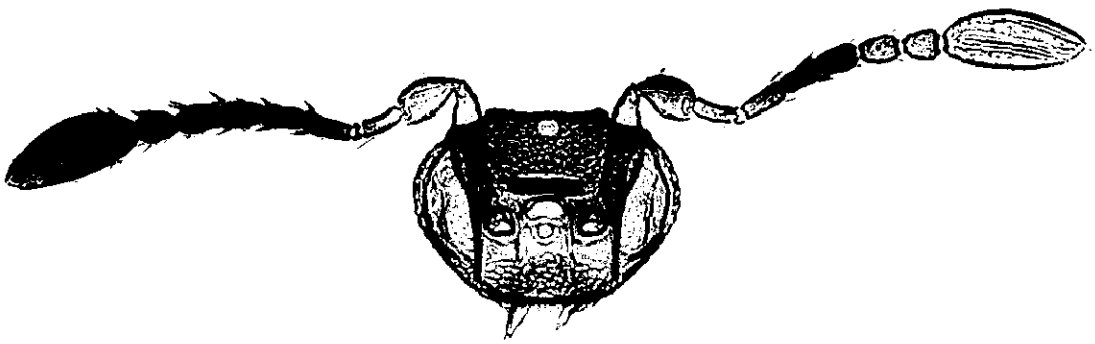


89 90

Figures 87--90 *Arescon narendrani* sp. nov. Female (Holotype): 87, head with antenna; 88, fore wing, 89, body, lateral; 90, fore tibia.



Figures 91–95 *Camptoptera muiri* (Perkins). Female: 91, head with antenna; 92, fore wing, 93, hind wing; 94, body, dorsal; 95, mesosoma showing sculpture on mesoscutum and scutellum.



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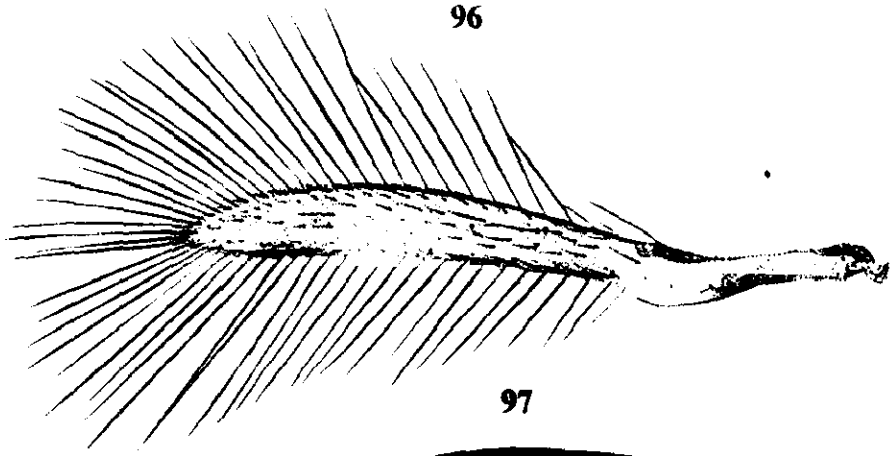

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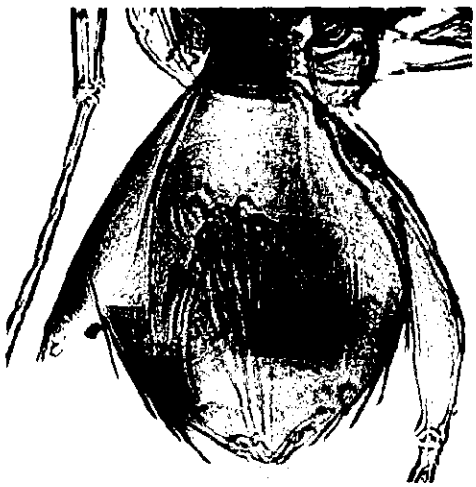

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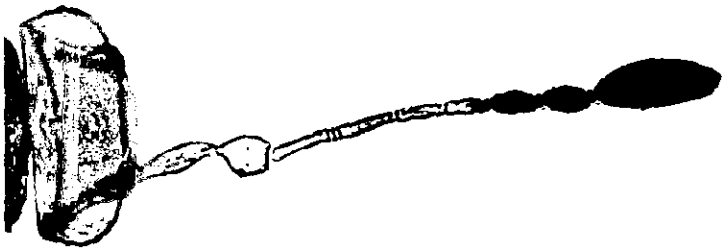
Figures 96–99 *Camptoptera matcheta* Subba Rao. Female: 96, head with antenna; 97, fore wing; 98, mesoscutum and scutellum showing sculpture; 99, metasoma showing ovipositor.



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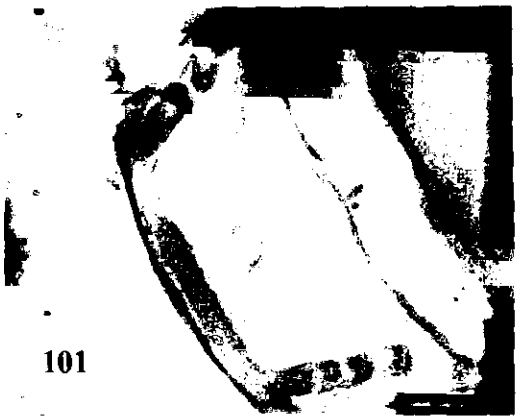

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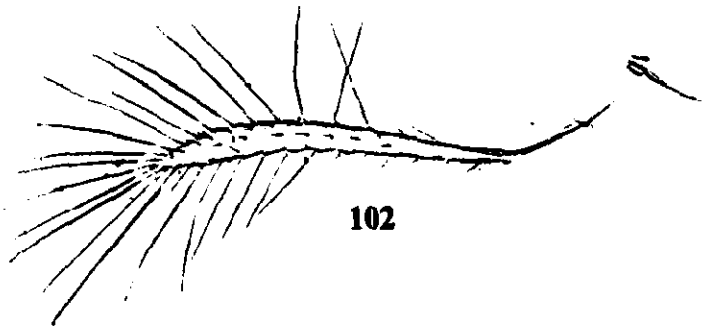

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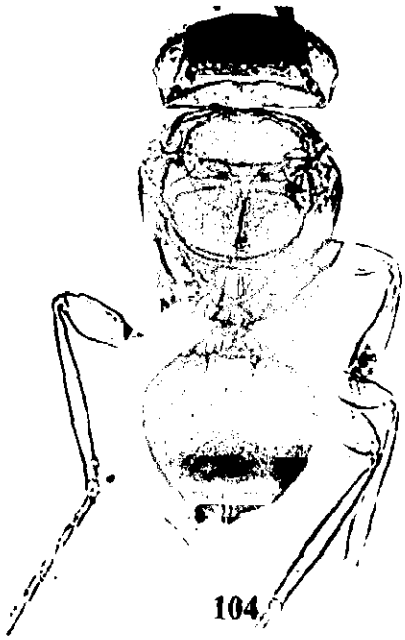

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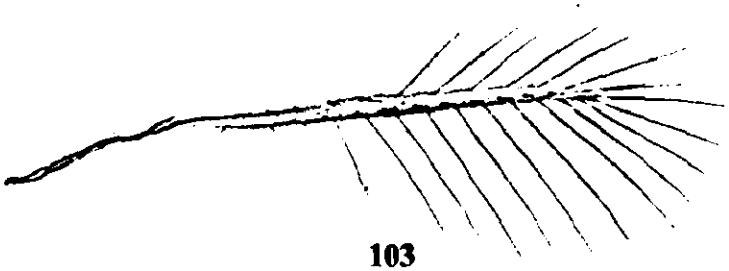

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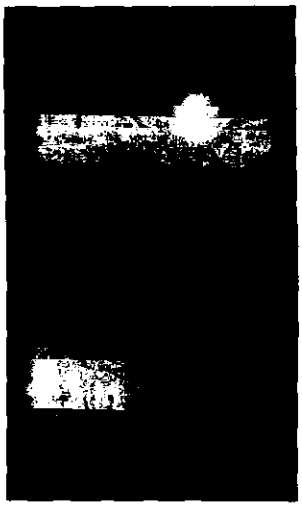

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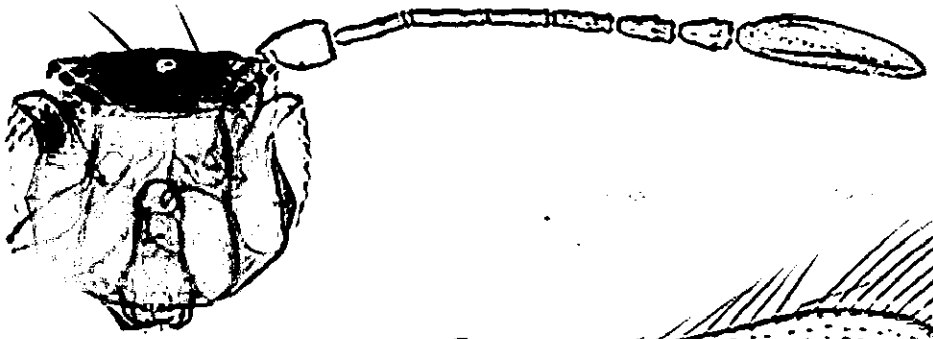
Figures 100–106 *Camptoptera assamensis* Rehmat & Anis. Female: 100, head with antenna; 101, head, dorsal; 102, fore wing; 103, hind wing; 104, body, dorsal; 105, part of scutellum showing sculpture; 106, part of metasoma showing ovipositor.



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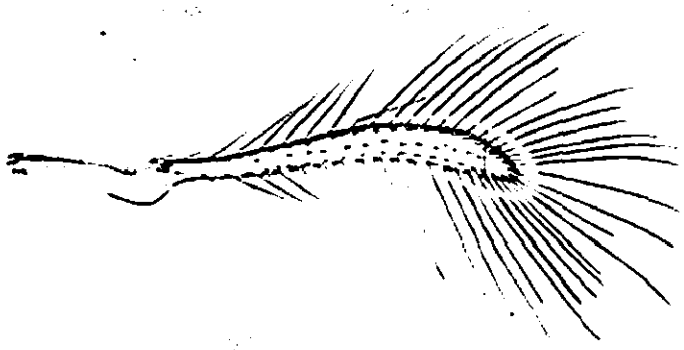

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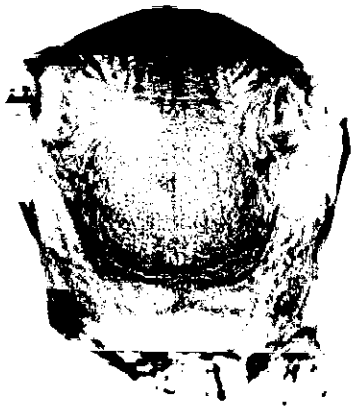

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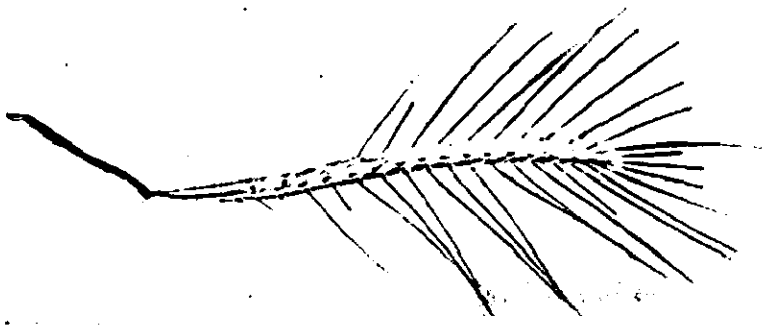

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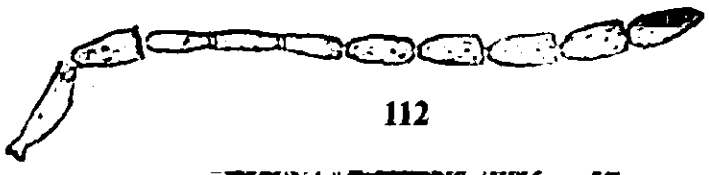

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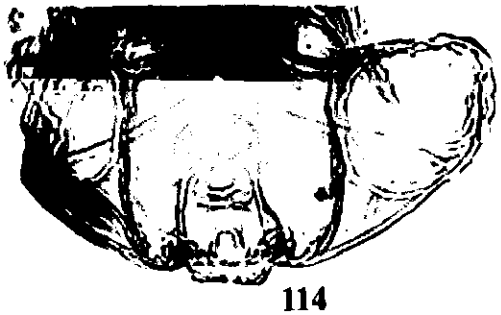
Figures 107–113 *Camptoptera dravida* Subba Rao. Female: 107, head with antenna; 108, fore wing; 109, hind wing; 110, mesosoma, dorsal; 111, metasoma showing ovipositor; Male: 112, antenna; 113, metasoma showing genitalia.



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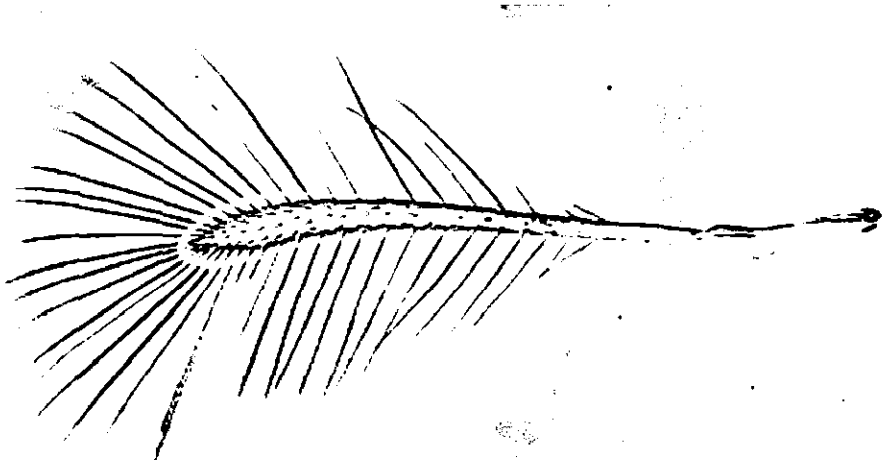

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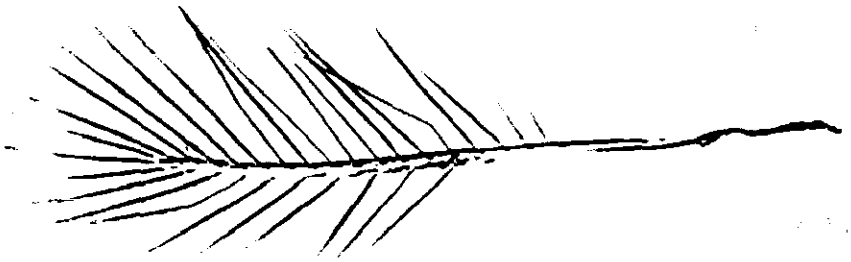

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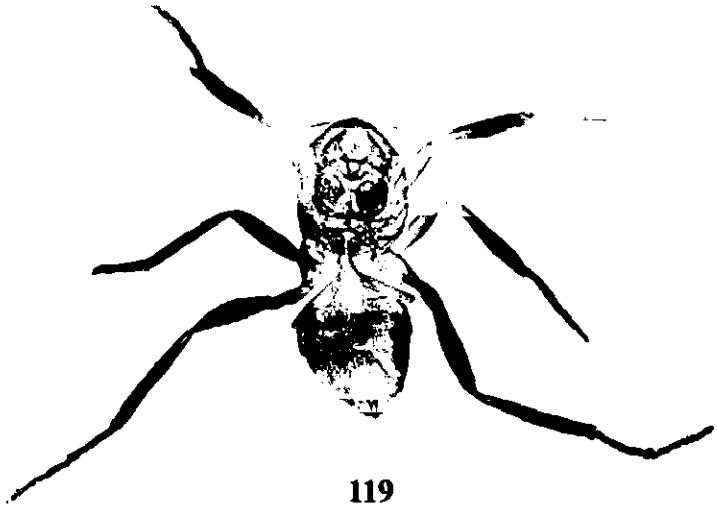

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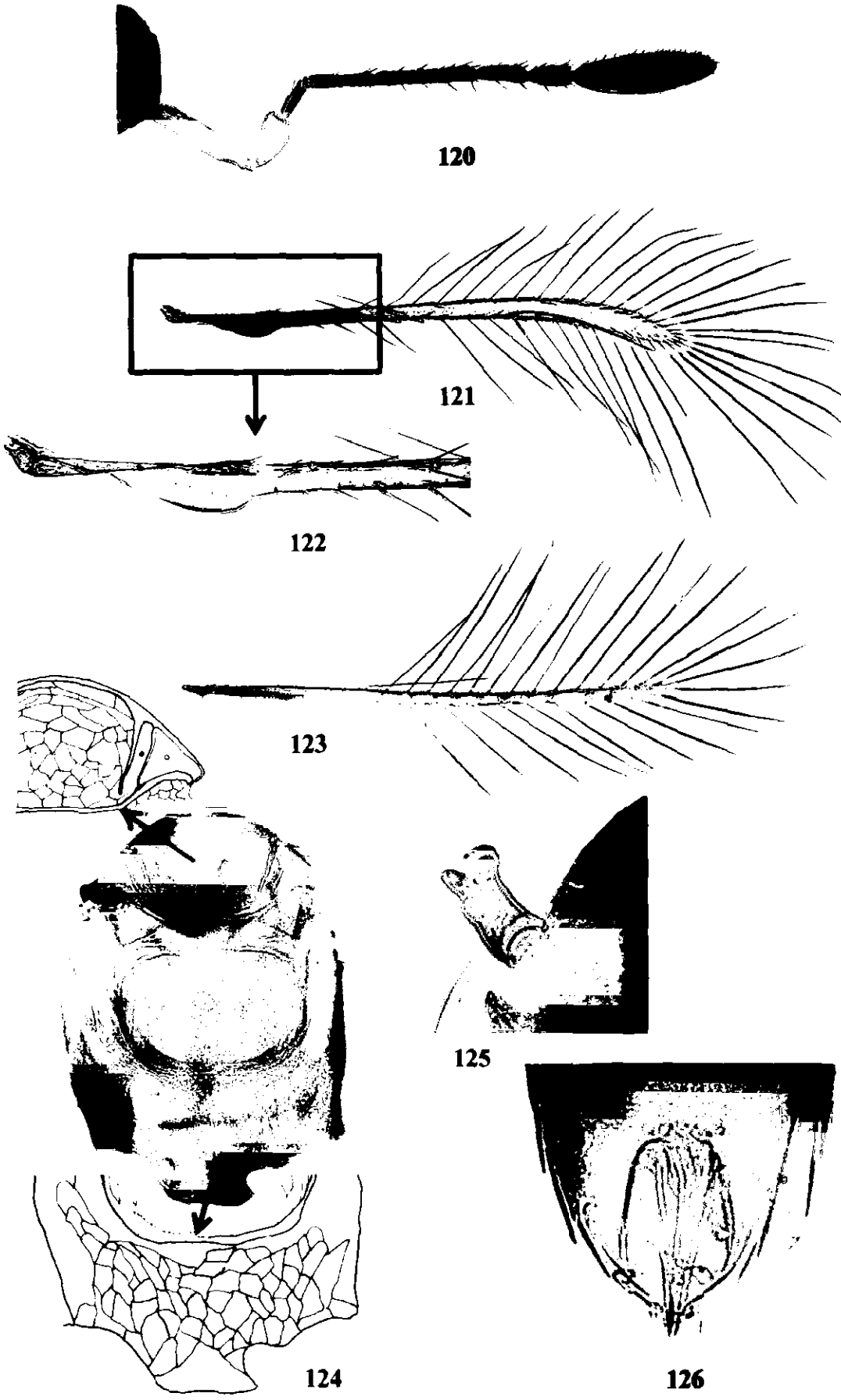
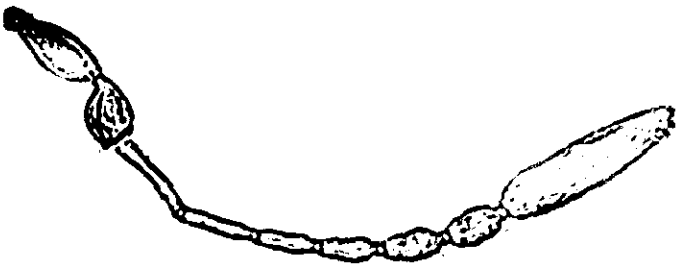
Figures 114–119 *Camptoptera minorui* Taguchi. Female: 114, head frontal; 115, antenna; 116, fore wing; 117, hind wing; 118, mesosoma, dorsal; 119, mesosoma and metasoma, dorsal.



Figures 120–126 *Camptoptera alanuda* sp. nov. Female (Holotype): 120, antenna; 121, fore wing; 122, fore wing, basal part; 123, hind wing; 124, mesosoma, dorsal; 125, petiole, lateral; 126, apical part of metasoma showing ovipositor;



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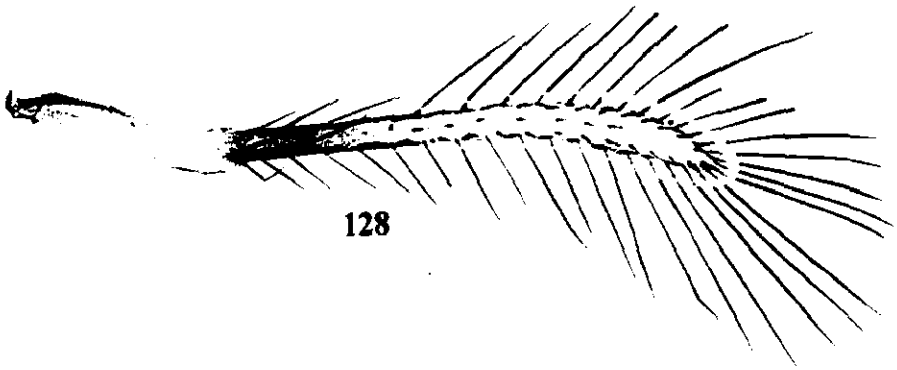

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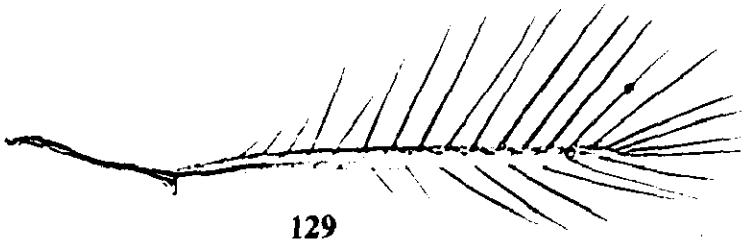

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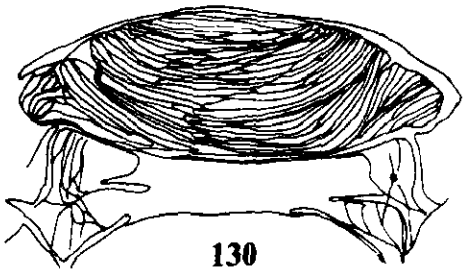

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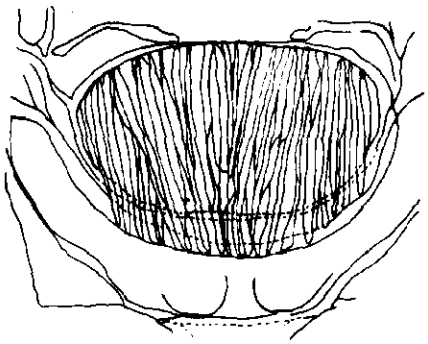

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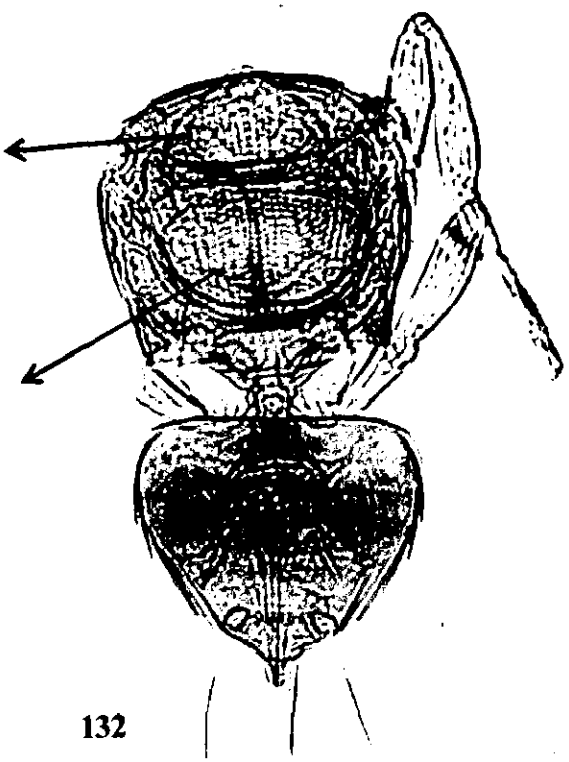

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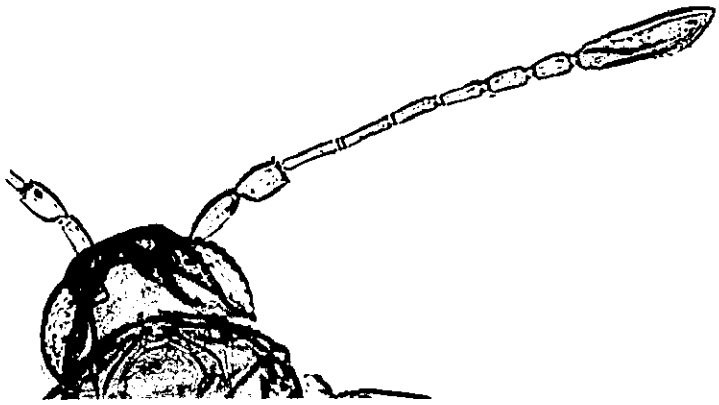
Figures 127–132 *Camptoptera okadomei* Taguchi. Female: 127, antenna; 128, fore wing; 129, hind wing; 130, mesoscutum showing sculpture; 131, scutellum showing sculpture; 132, mesosoma and metasoma, dorsal.



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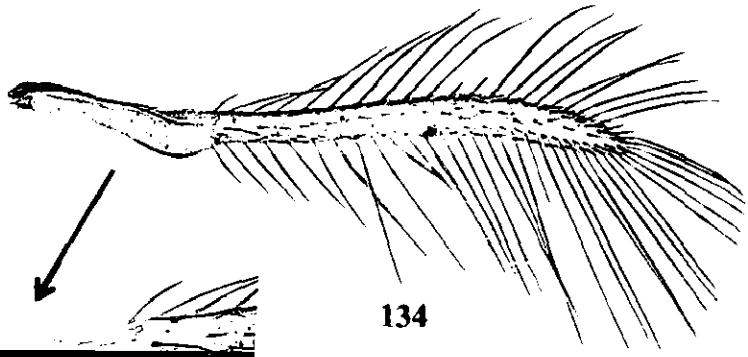

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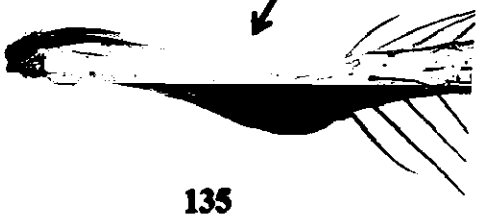

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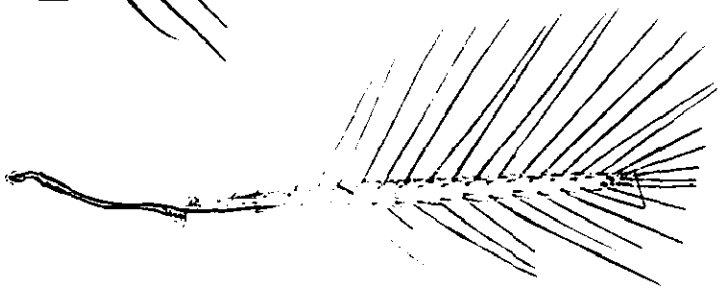

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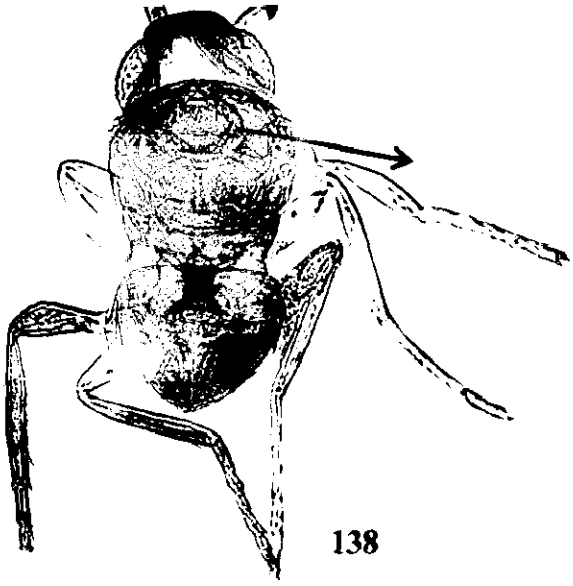

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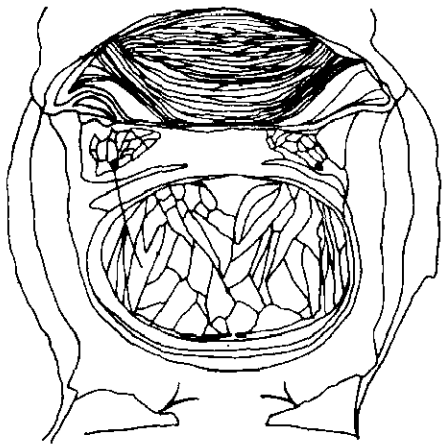

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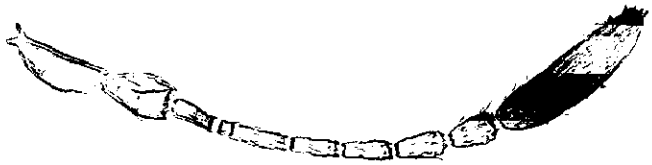
Figures 133–138 *Camptoptera cardigastra* sp. nov. Female (Holotype): 133, head with antenna; 134, fore wing; 135, fore wing , basal part; 136, hind wing; 137, mesosoma showing sculpture; 138, body, dorsal.

139



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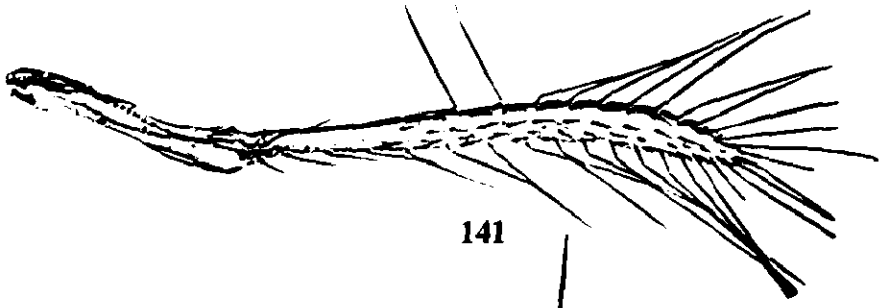

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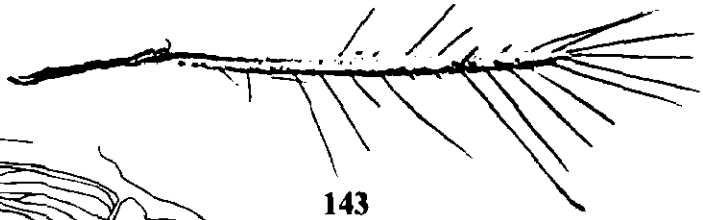

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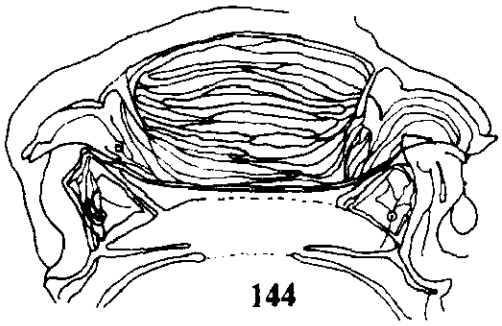

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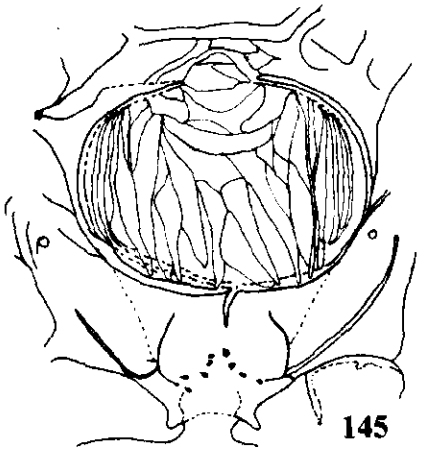

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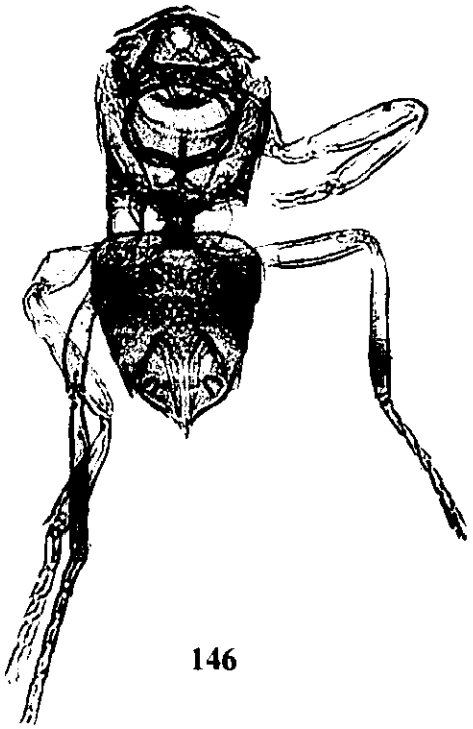
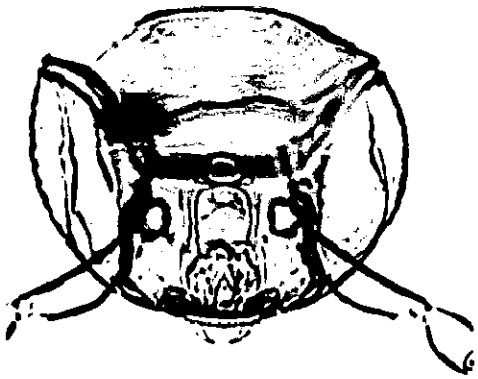


146

Figures 139–146 *Camptoptera fusca* sp. nov. Female (Holotype): 139, head; 140, antenna; 141, fore wing, 142, fore wing, basal part enlarged; 143, hind wing; 144, mesoscutum showing sculpture; 145, scutellum and propodeum showing sculpture; 146, body, dorsal.



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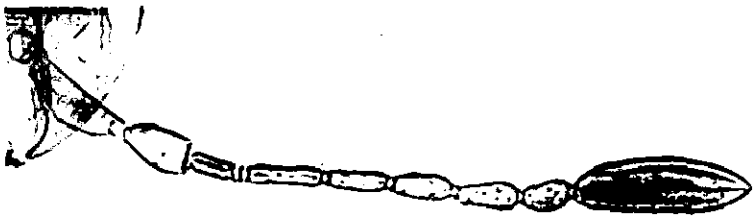

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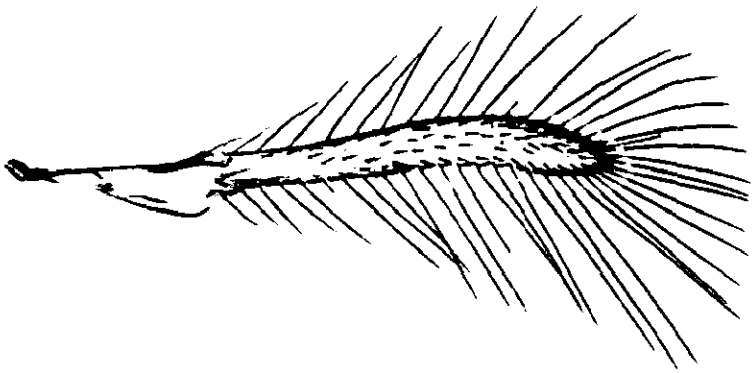

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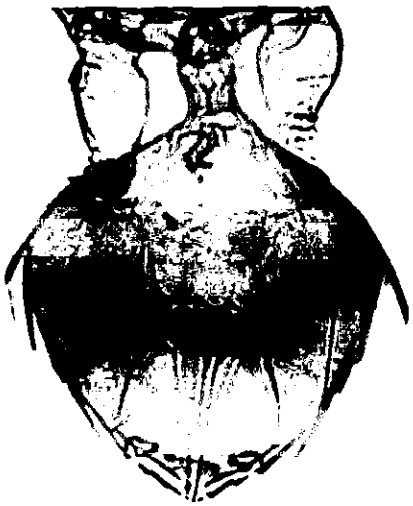
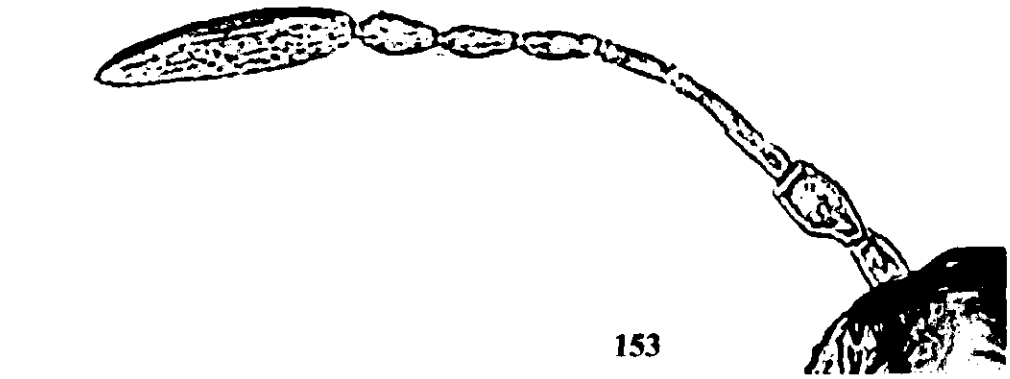


152

Figures 147–152 *Camptoptera sakaii* Taguchi. Female: 147, head; 148, antenna; 149, mesosoma, dorsal; 150; mesoscutum showing sculpture; 151, fore wing; 152, metasoma showing ovipositor.



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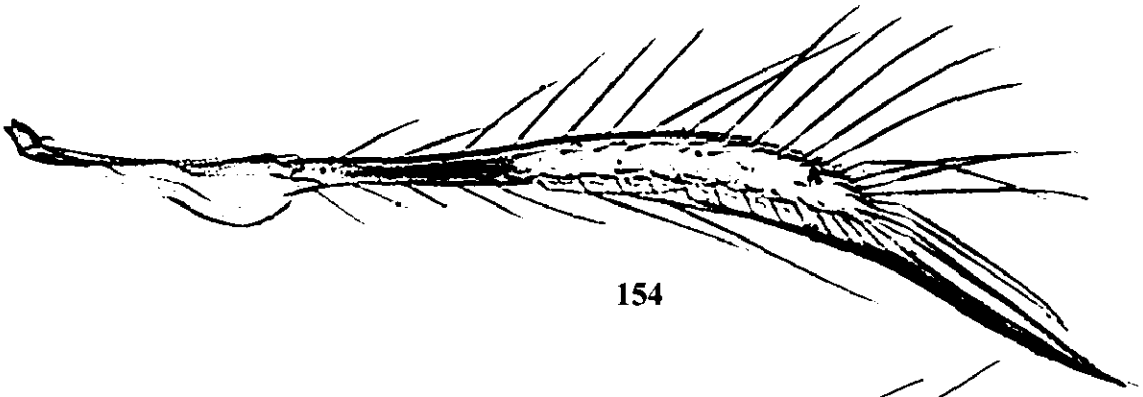

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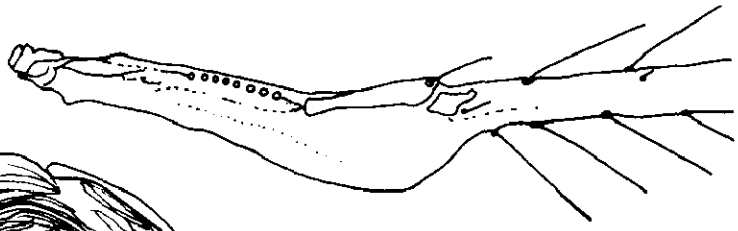

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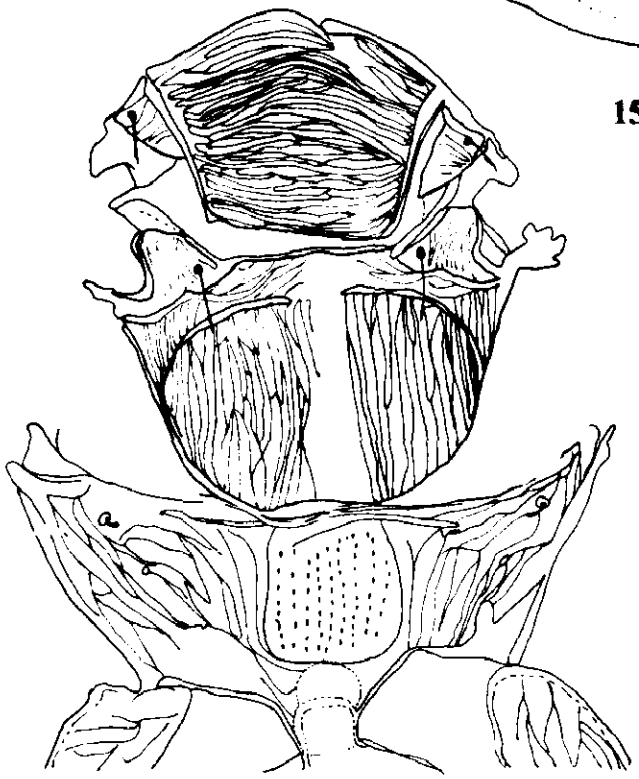

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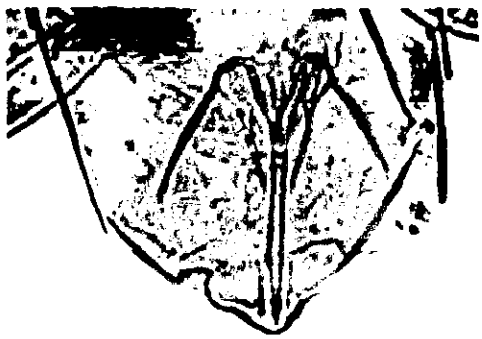
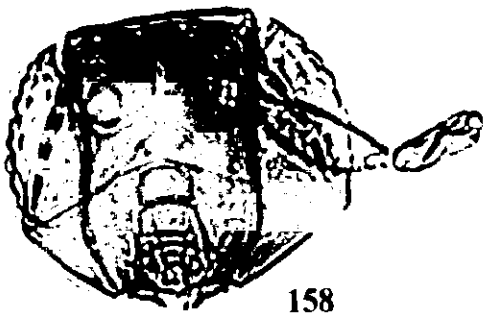


157

Figures 153–157 *Camptoptera franciscae* (Debauche). Female: 153, antenna; 154, fore wing; 155, fore wing basal part showing division of venation; 156, mesosoma showing sculpture; 157; apical part of metasoma showing ovipositor.



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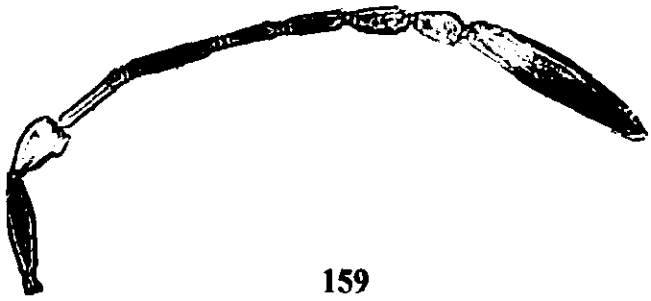

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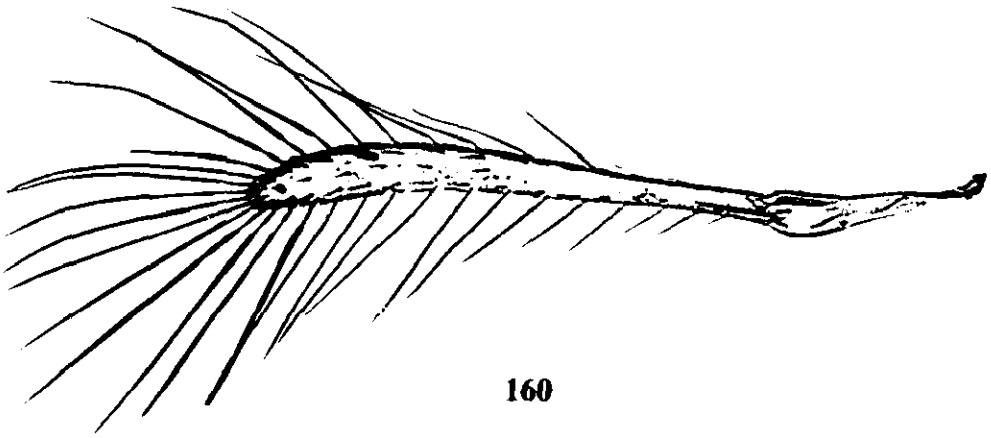

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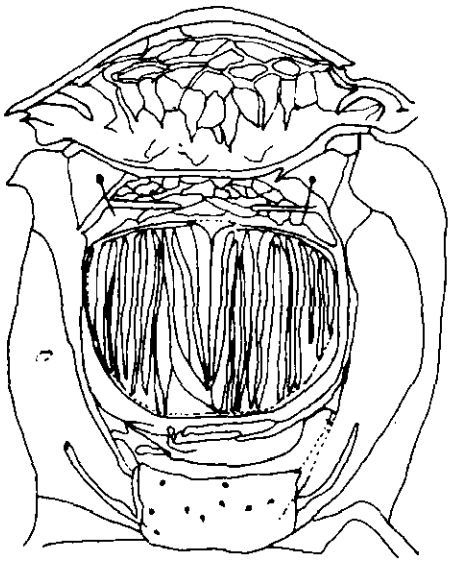

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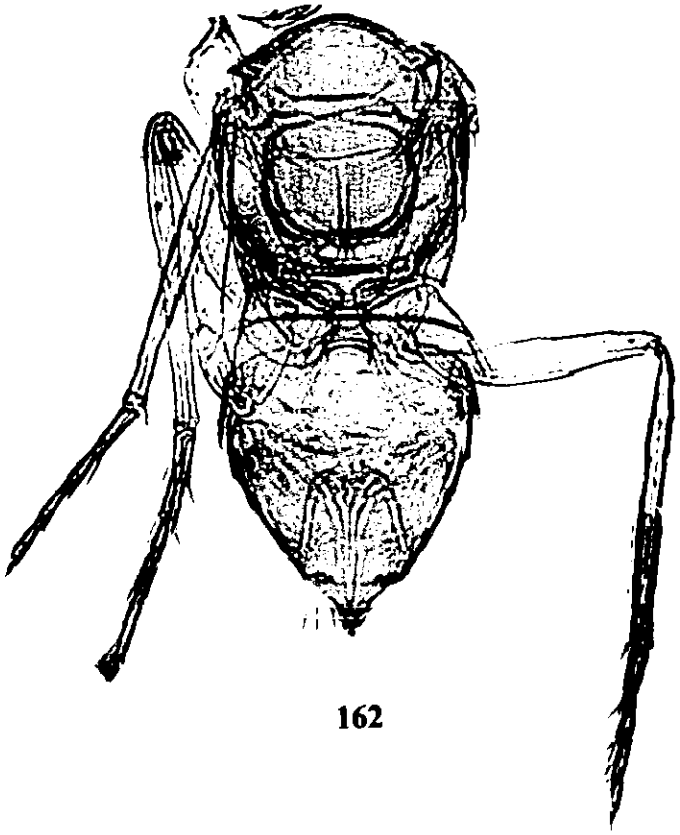
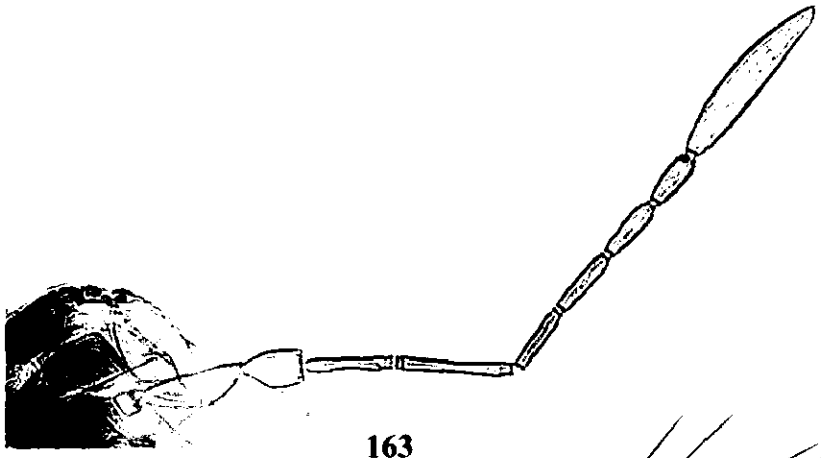


162

Figures 158–162 *Camptoptera aligarhensis* sp. nov. Female (Holotype): 158, head; 159, antenna; 160, fore wing; 161, mesosoma showing sculpture; 162; body, dorsal.



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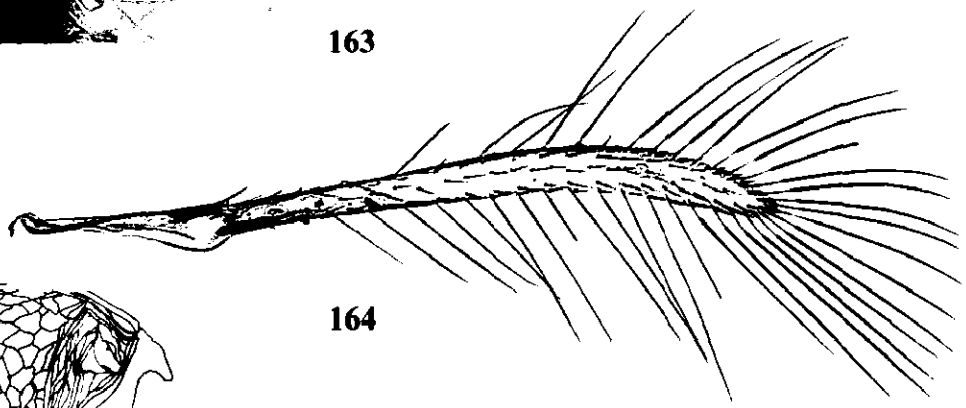

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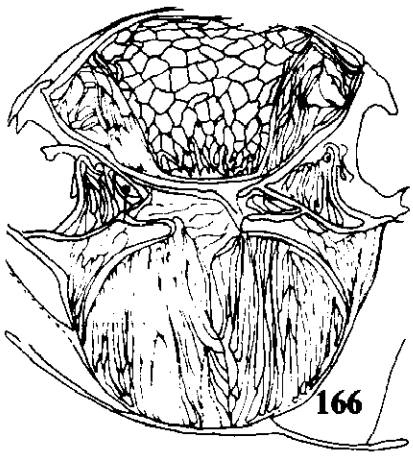

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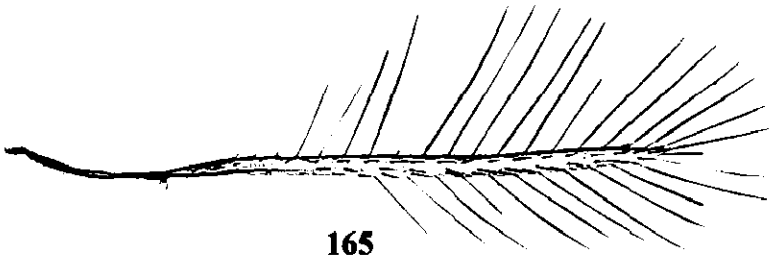

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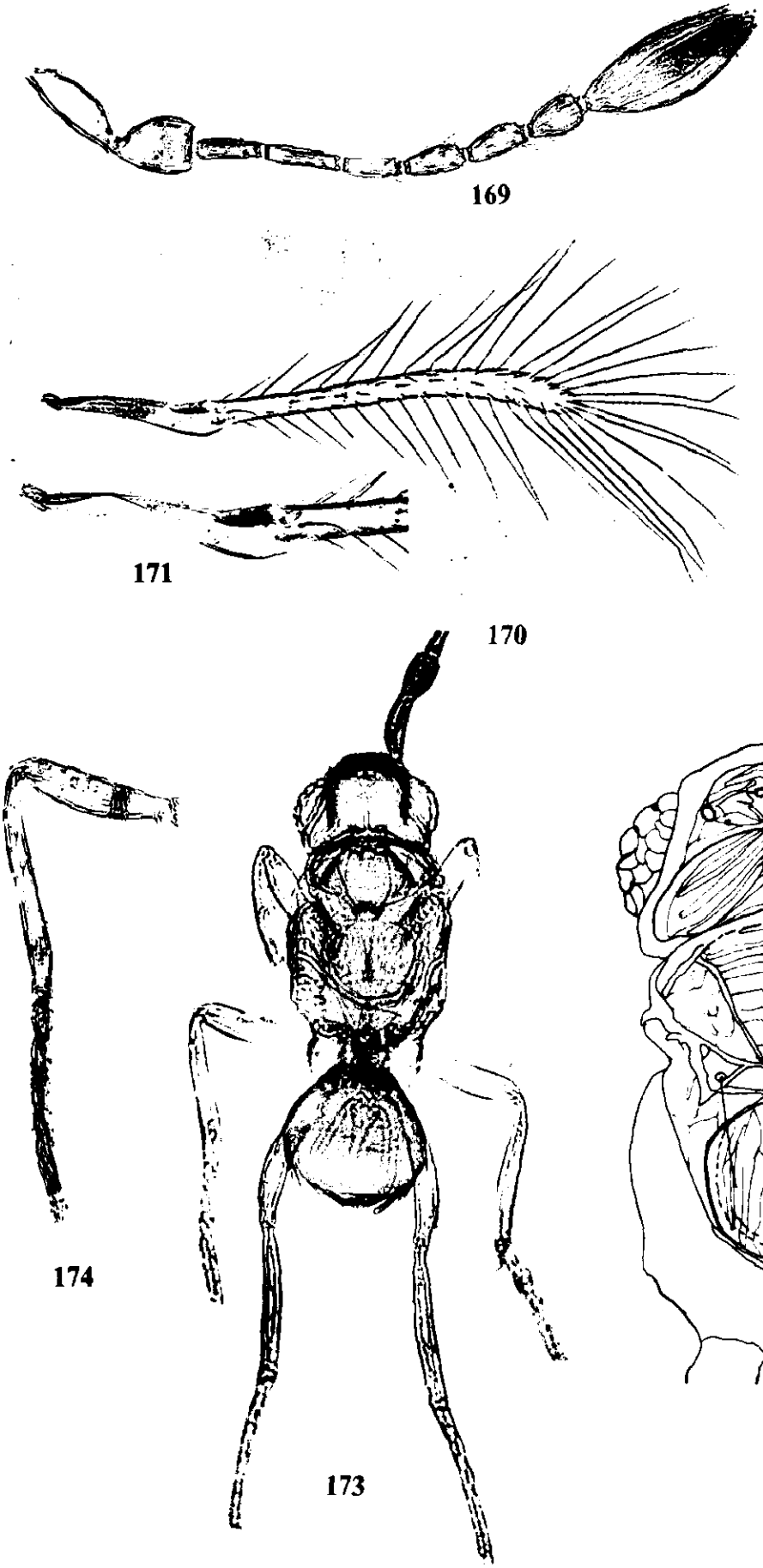
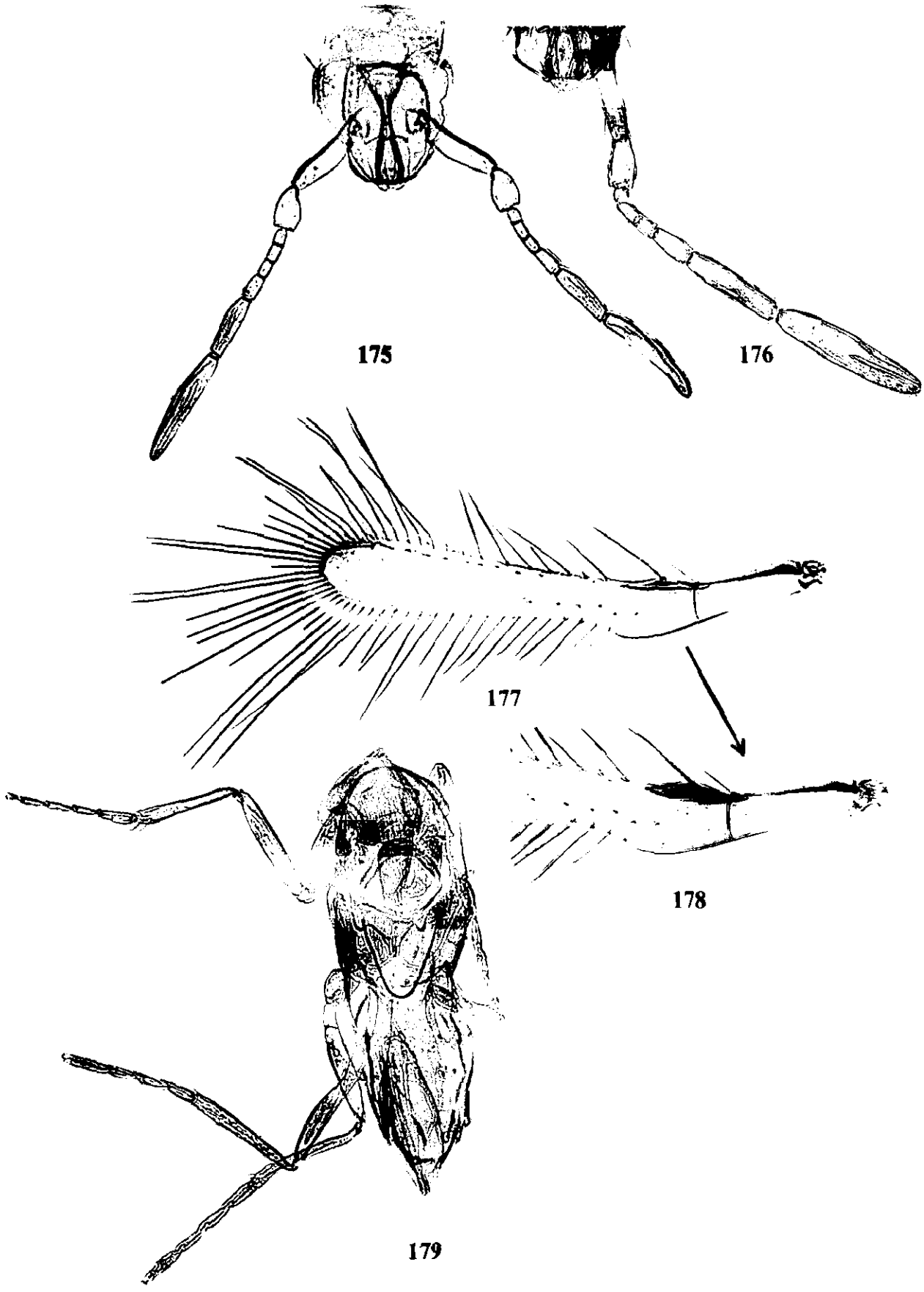
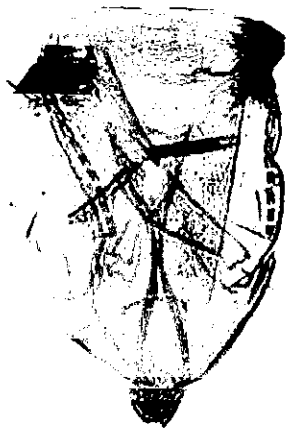
Figures 163–168 *Camptoptera denticularis* sp. nov. Female (Holotype): 163, head with antenna; 164, fore wing; 165, hind wing; 166, mesosoma, dorsal; 167, mesoscutum and scutellum showing sculpture; 168; metasoma, dorsal.



Figures 169–174 *Eofoesteria manipurensis* sp. nov. Female (Holotype): 169, antenna; 170, fore wing; 171, fore wing with basal part enlarged; 172, head + mesosoma, showing sculpture; 173; body, dorsal; 174, tarsal segments.



Figures 175–179 *Erythmelus (Parallelaptera) panis* Enock. Female (Orissa): 175, head with antenna; 176, antenna (Kerala); 177, fore wing; 178, fore wing basal part enlarged; 179, mesosoma and metasoma, dorsal.



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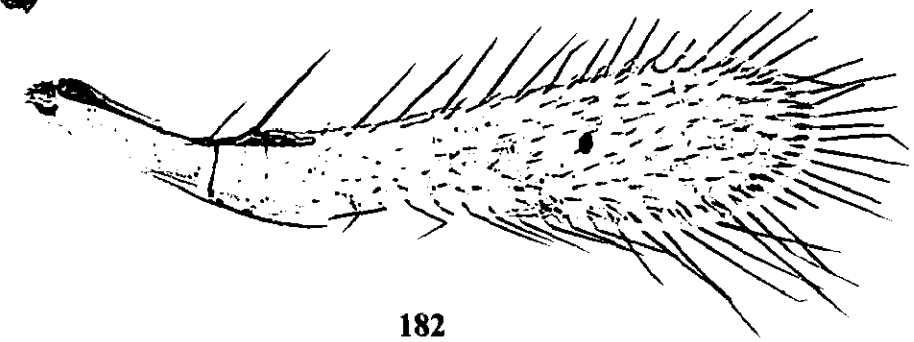

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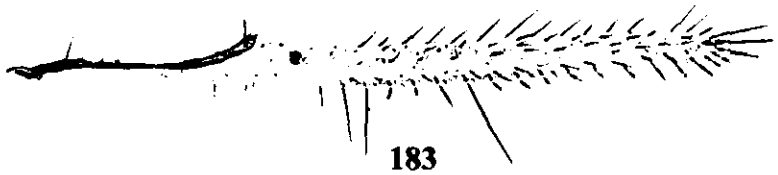

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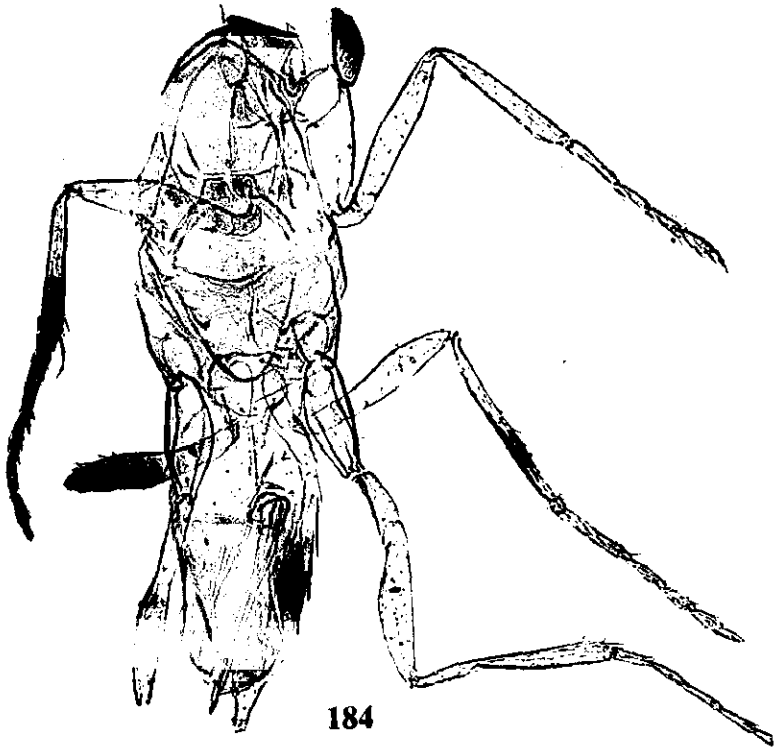
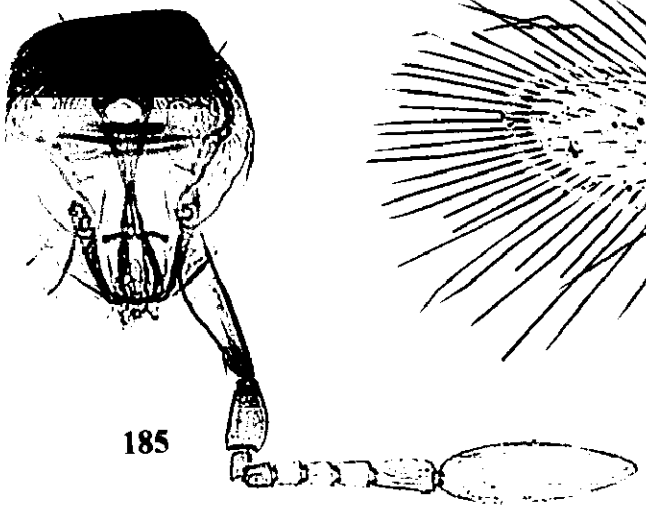


184

Figures 180–184 *Erythmelus (Erythmelus) rosascostai* Ogloblin. Female: 180, head; 181, antenna; 182, fore wing; 183, hind wing; 184, body, dorsal.



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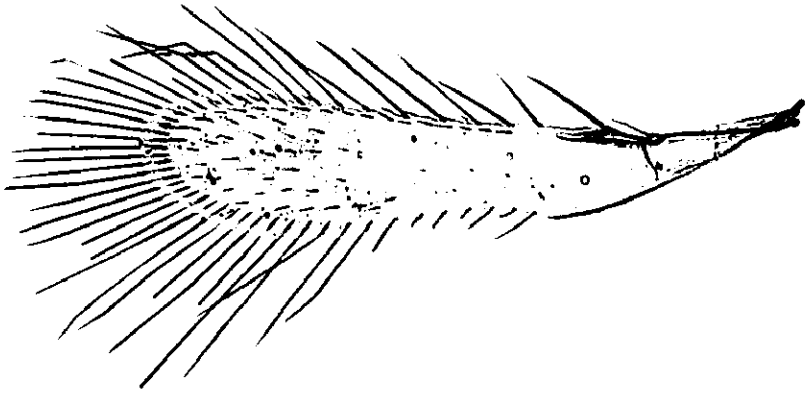

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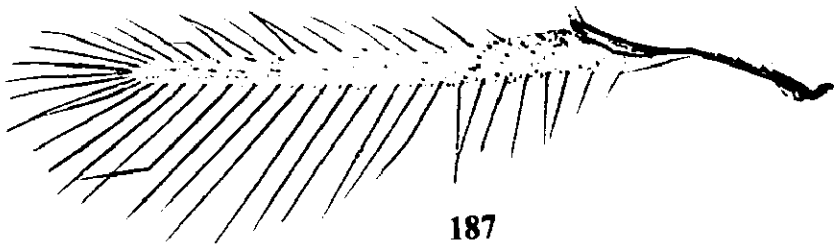

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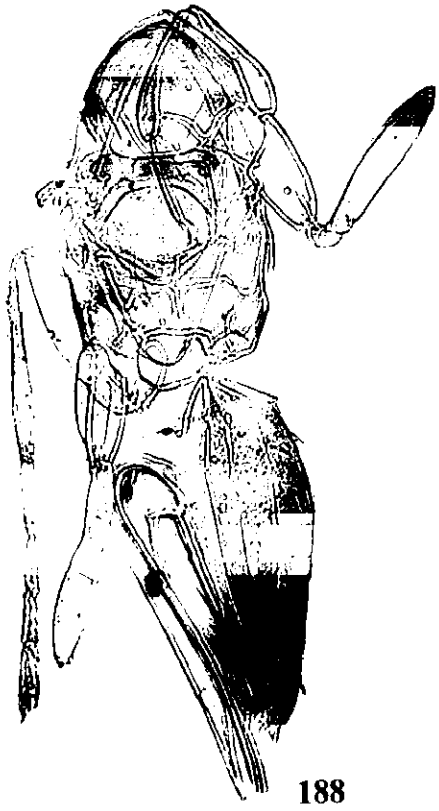

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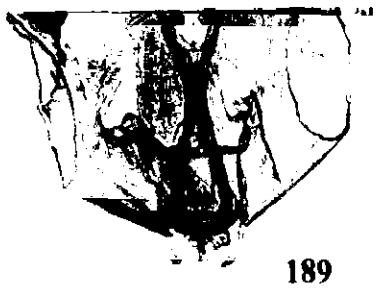
Figures 185–188 *Erythmelus (Erythmelus) flavovarius* (Walker). Female: 185, head wit antenna; 186, fore wing; 187, hind wing; 188, mesosoma and metasoma, dorsal.



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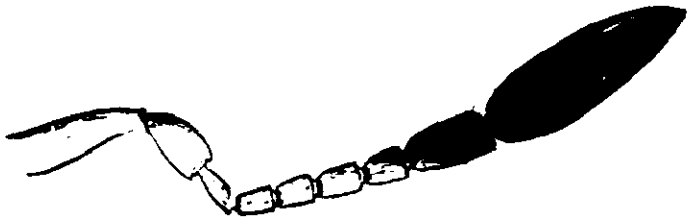

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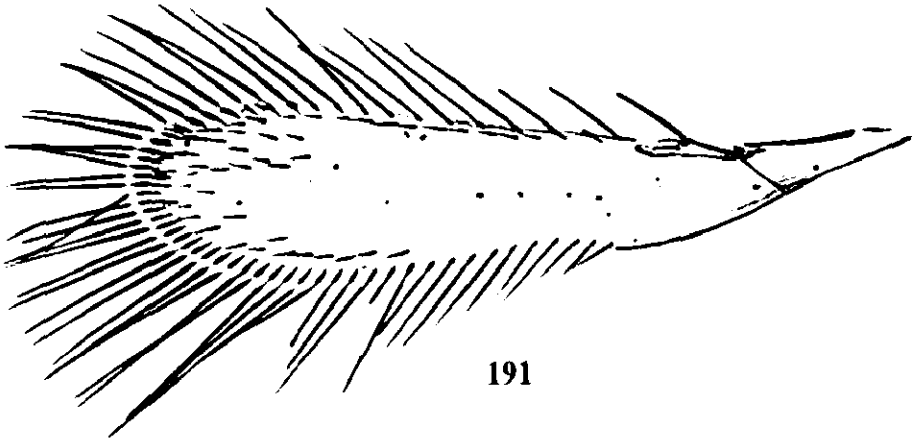

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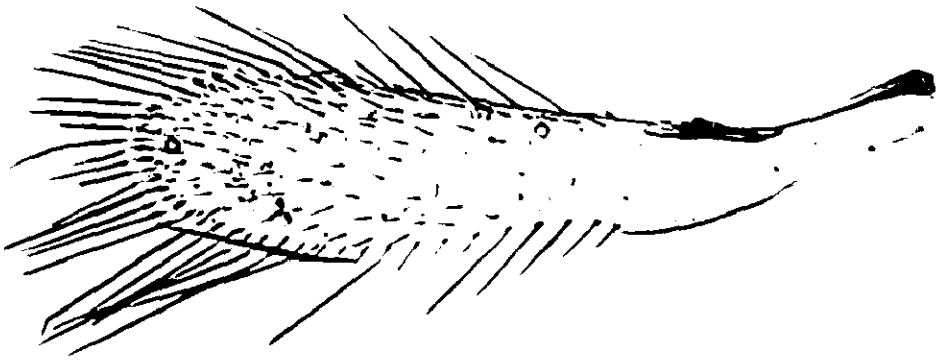
Figures 189–194 *Erythmelus (Erythmelus) miridiphagus* Dozier. Female: 189, head; 190, antenna; 191, fore wing; 192, hind wing; 193, mesosoma, dorsal; 194, metasoma showing ovipositor.

195



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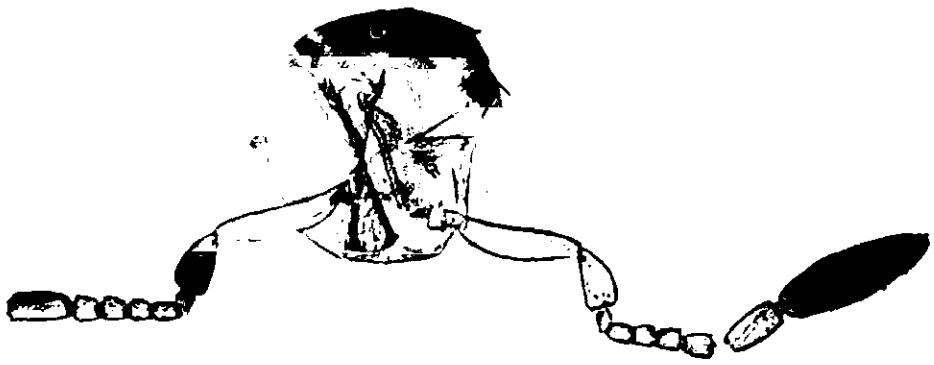
Figures 195–198 *Erythmelus (Erythmelus) jawanensis* sp. nov. Female (Holotype): 195, head with antenna; 196, fore wing; 197, mesosoma, dorsal; 198, metasoma showing ovipositor.



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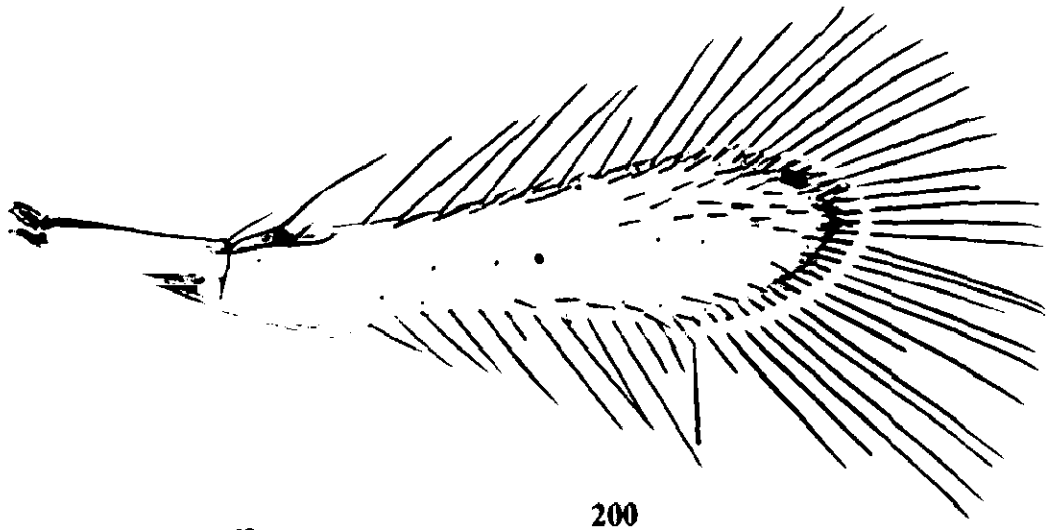

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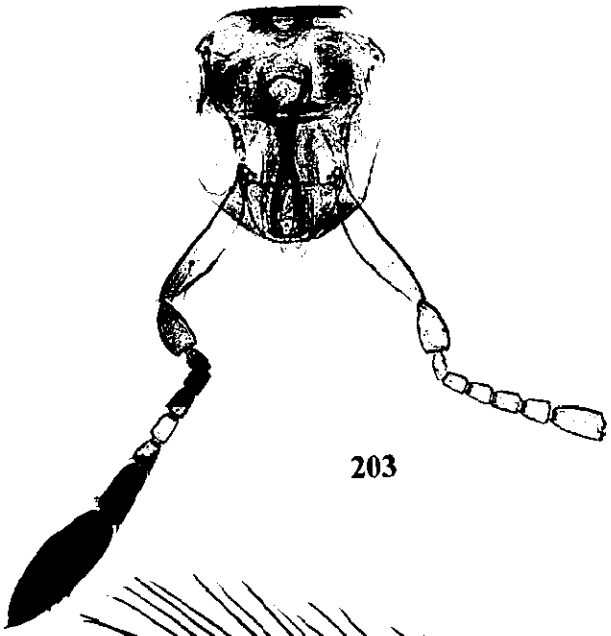
Figures 199–202 *Erythmelus (Erythmelus) shillongus* sp. nov. Female (Holotype): 199, head with antenna; 200, fore wing; 201, mesosoma, dorsal; 202, metasoma showing ovipositor.



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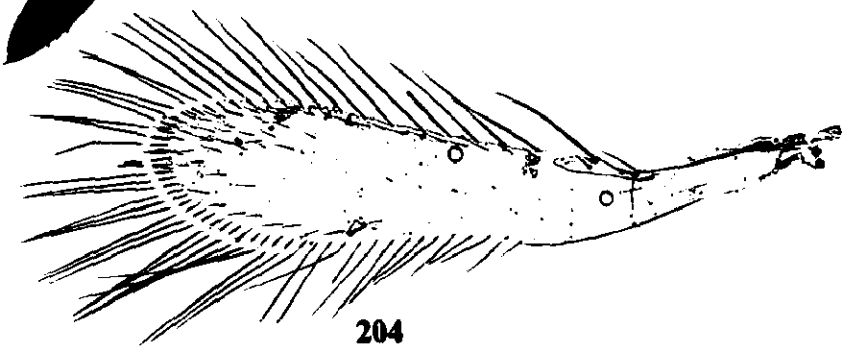

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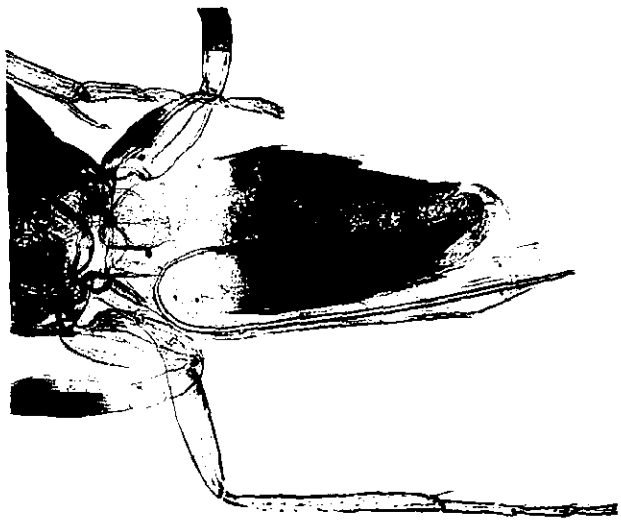

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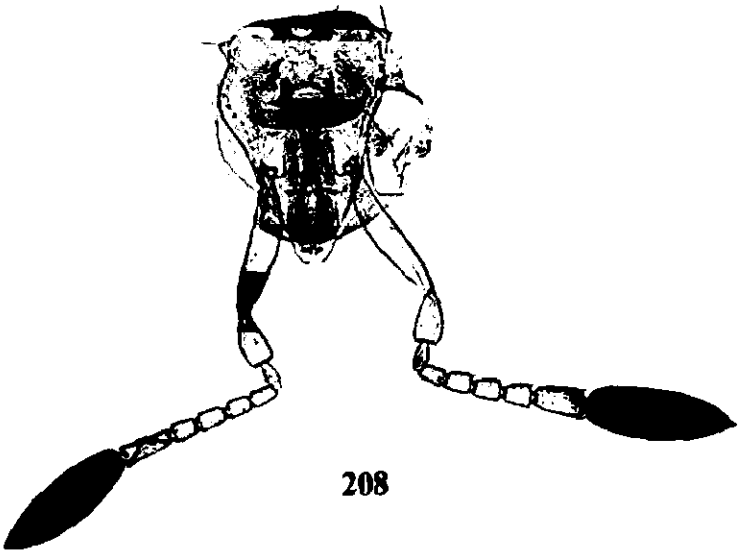
Figures 203–207 *Erythmelus (Erythmelus) lygivorous* Viggiani & Jesu. Female: 203, head with antenna; 204, fore wing; 205, hind wing, 206, mesosoma, dorsal; 207, metasoma showing ovipositor.



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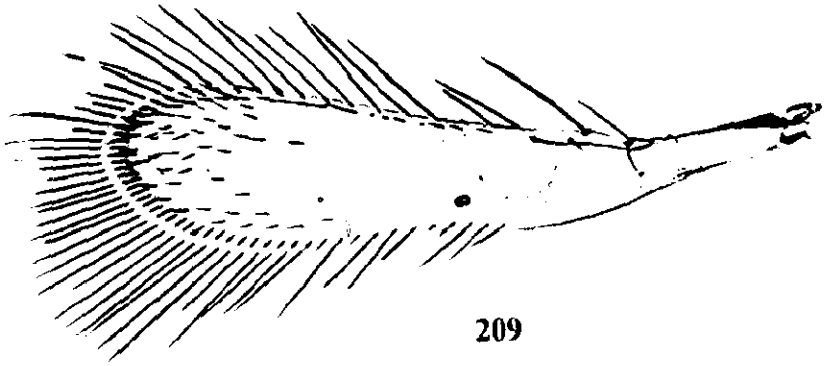

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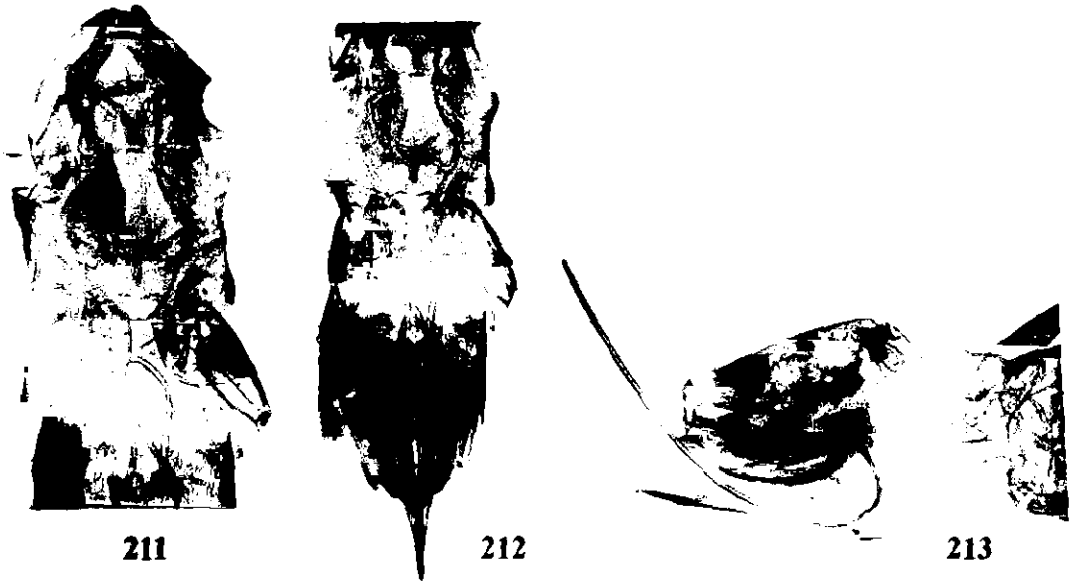
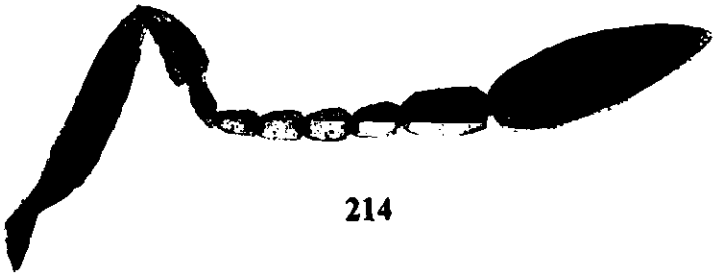


211 212 213

Figures 208–213 *Erythmelus (Erythmelus) nuinu* Triapitsyn. Female: 208, head with antenna; 209, fore wing; 210, hind wing, 211, mesosoma, dorsal; 212, metasoma (dorsal) showing exserted ovipositor; 213, metasoma (lateral) showing exserted ovipositor.



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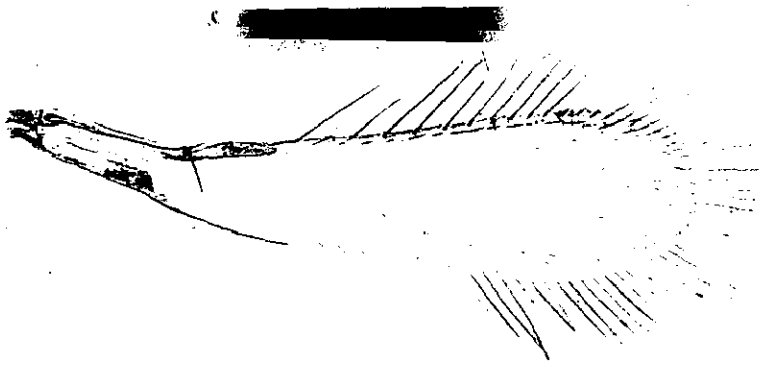

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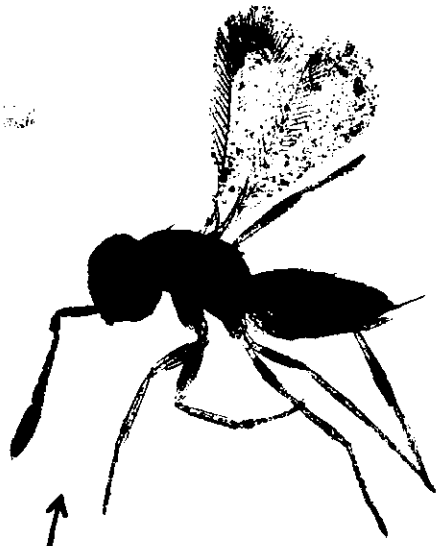

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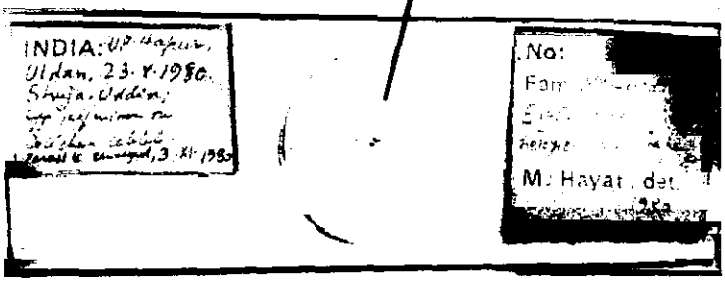

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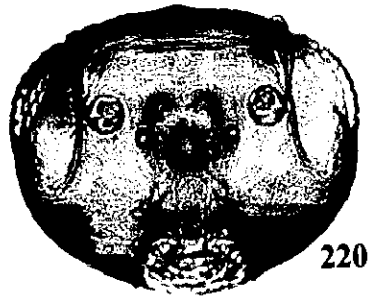
Figures 214–219 *Erythmelus (Erythmelus) helopeltidis* Gahan. Female: 214, antenna; 215, fore wing; 216, hind wing, 217, mesosoma, lateral; 218, metasoma (lateral) showing exserted ovipositor; 219, slide mount of Hapur specimen showing female habitus.



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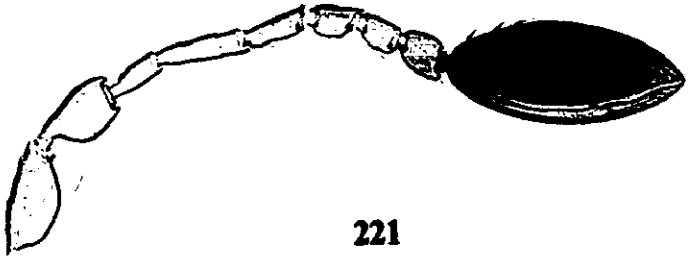

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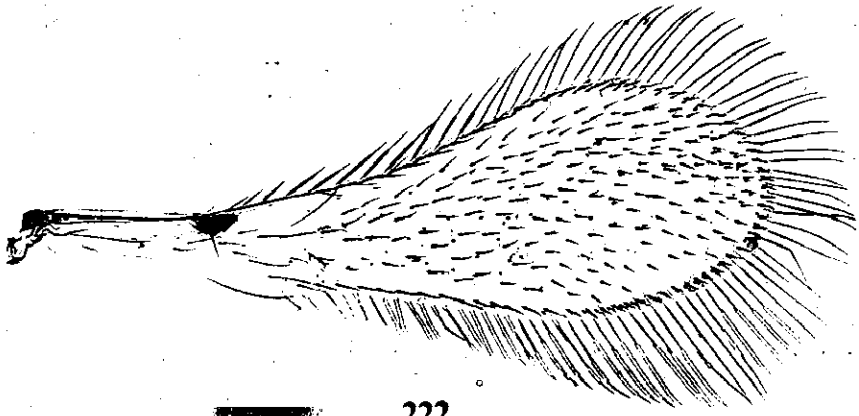

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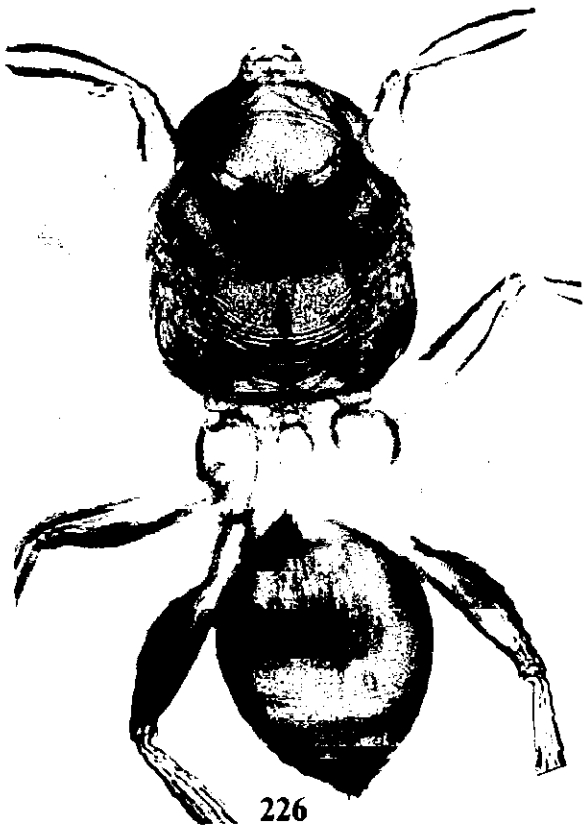

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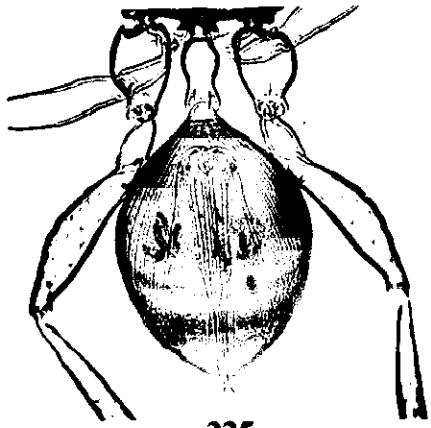

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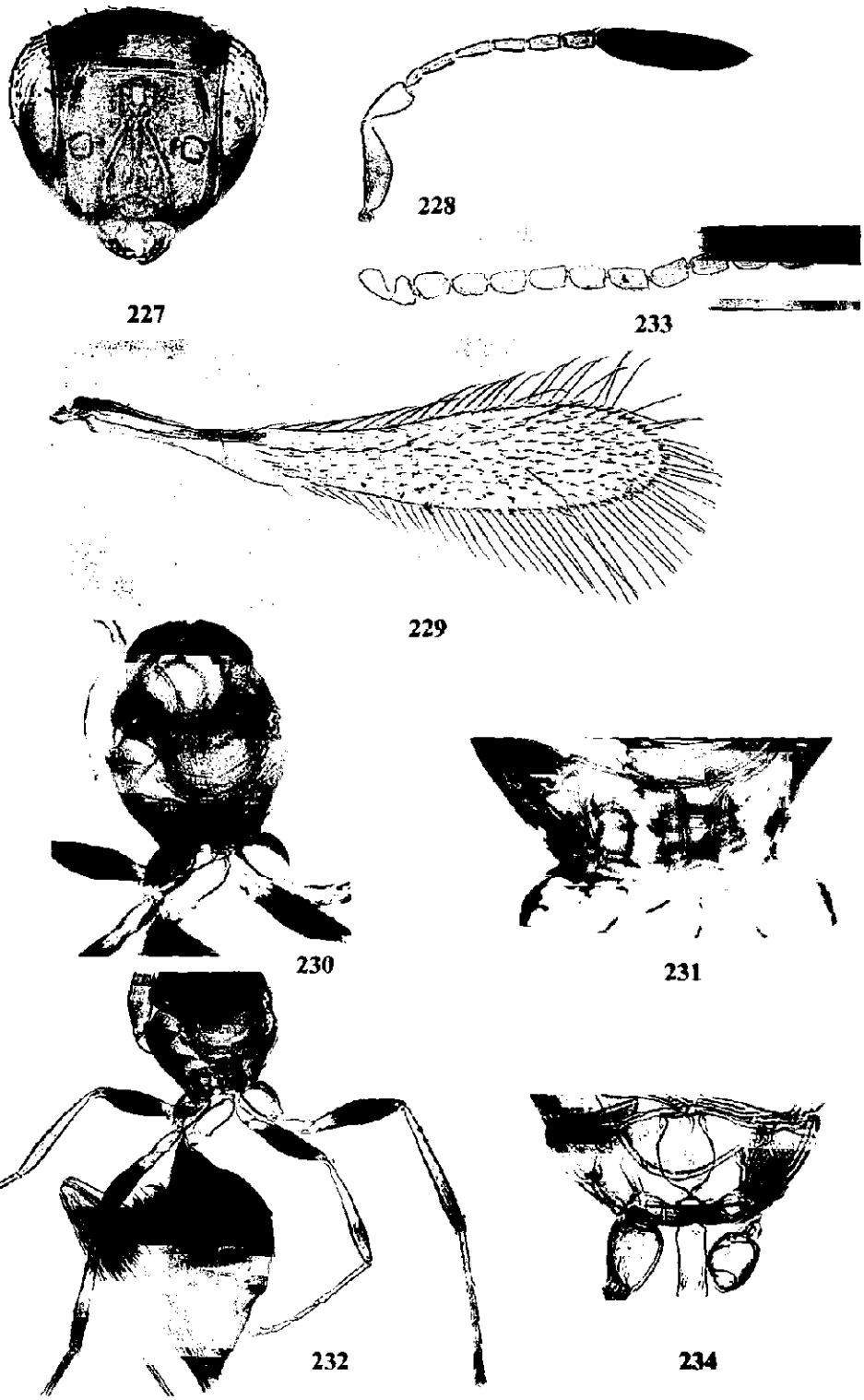
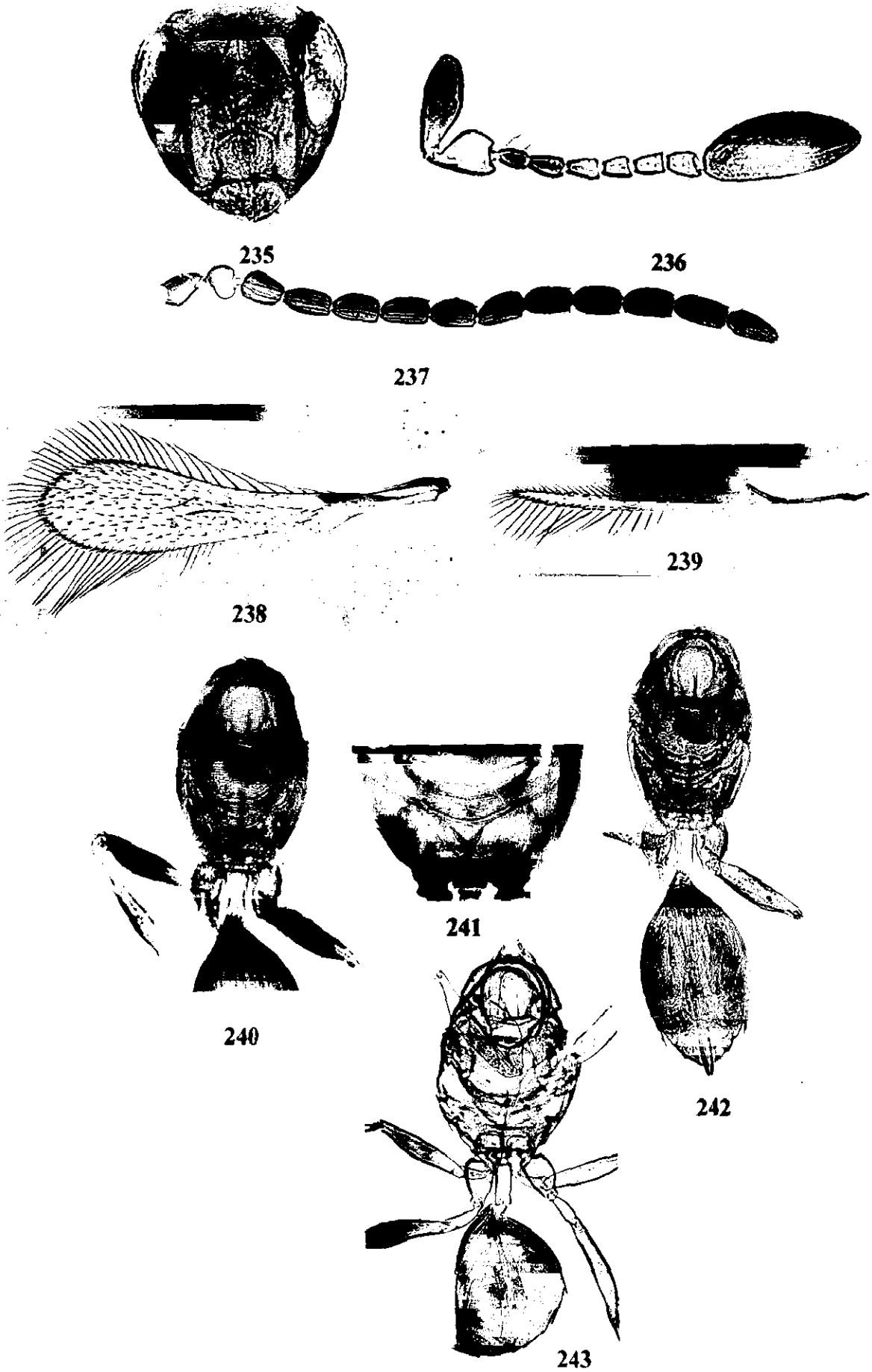
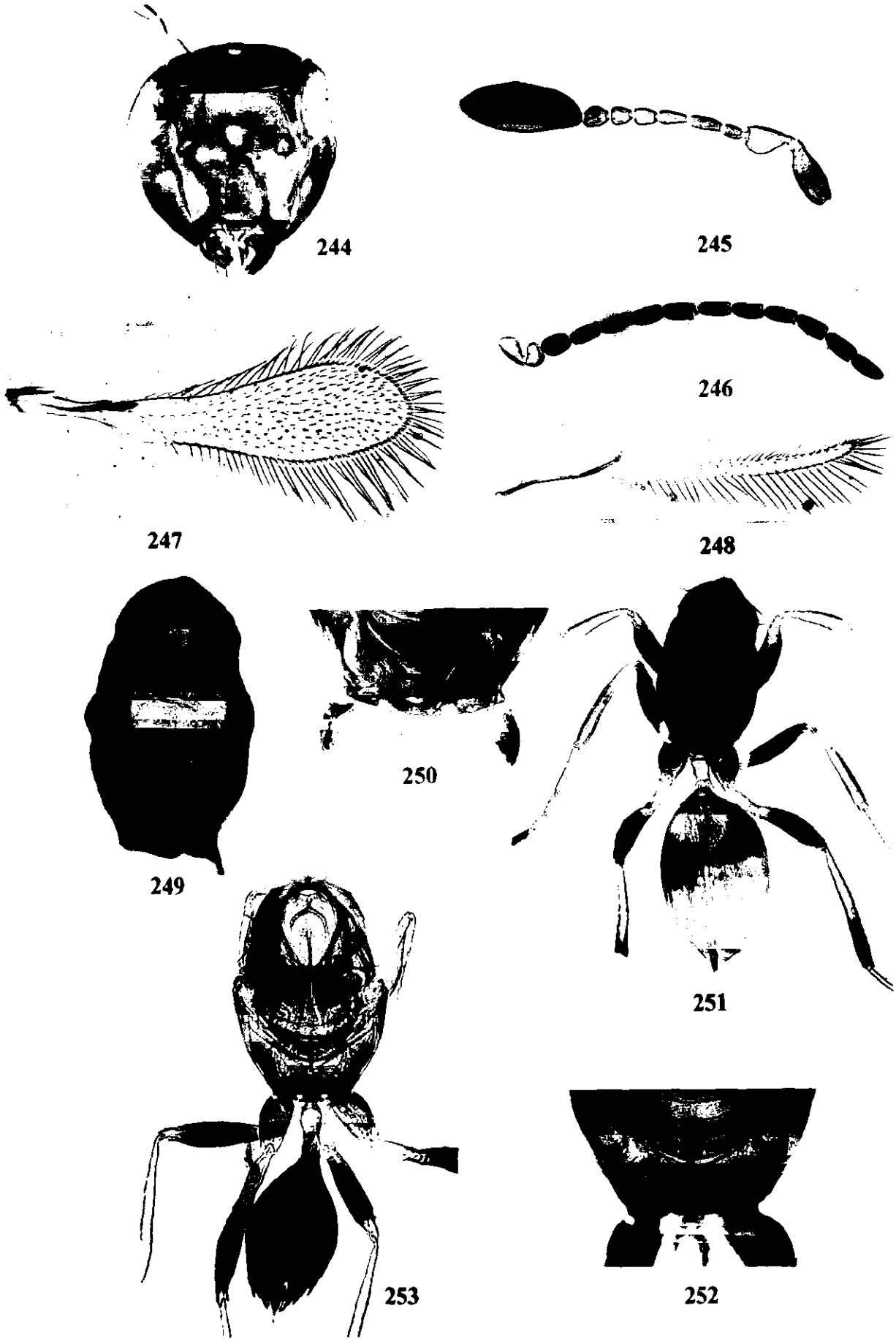
Figures 220–226 *Himopolynema haflongum* Hayat & Singh. Female: 220, head; 221, antenna; 222, fore wing; 223, hind wing, 224, scutellum+ propodeum, dorsal; 225, metasoma, showing ovipositor; 226, mesosoma and metasoma, dorsal.



Figures 227–234 *Himopolynema longiclavatum* Hayat & Anis. Female: 227, head; 228, antenna; 229, fore wing; 230, mesosoma, dorsal; 231, propodeum showing carinae; 232, metasoma, showing ovipositor; Male: 233, antenna; 234, propodeum showing carinae.



Figures 235–243 *Himopolynema hishimonus* Taguchi. Female: 235, head; 236, antenna; 238, fore wing; 239, hind wing; 240, mesosoma, dorsal; 241, propodeum showing carinae; 242, mesosoma and metasoma, dorsal; Male: 237, antenna; 243, mesosoma and metasoma, dorsal.



Figures 244–253 *Himopolynema parviscutum* Taguchi. Female: 244, head; 245, antenna; 247, fore wing; 248, hind wing; 249, mesosoma, dorsal; 250, propodeum showing carinae; 251, body, dorsal; Male: 246, antenna; 252, propodeum showing carinae; 253, body, dorsal.

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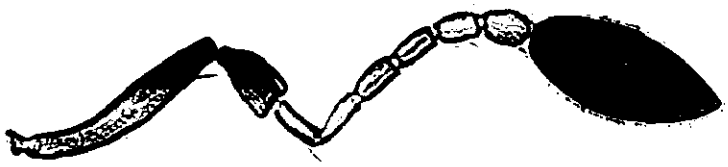

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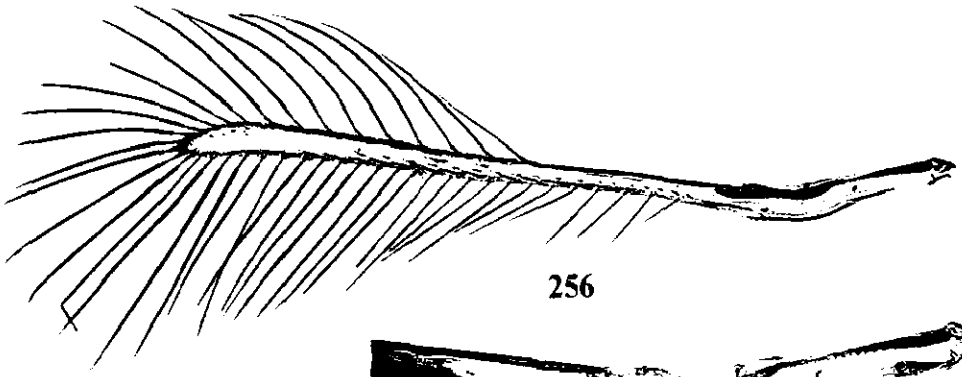

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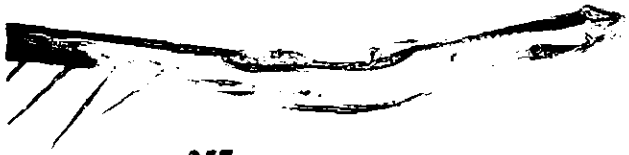

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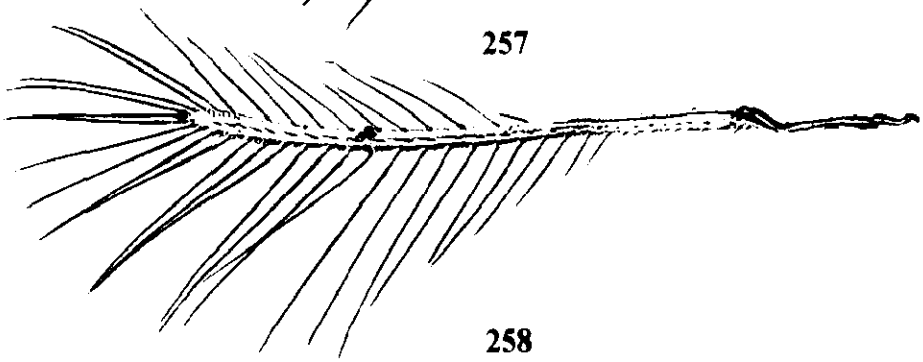

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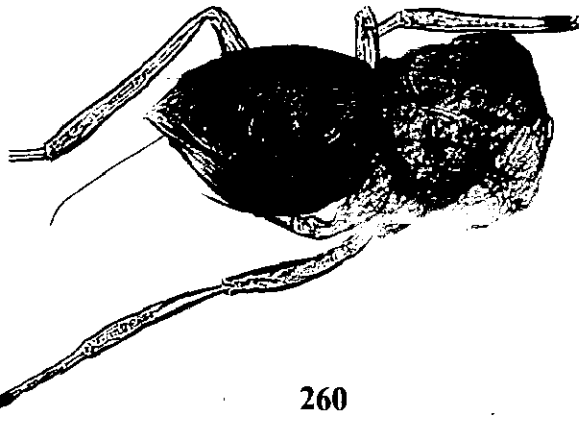

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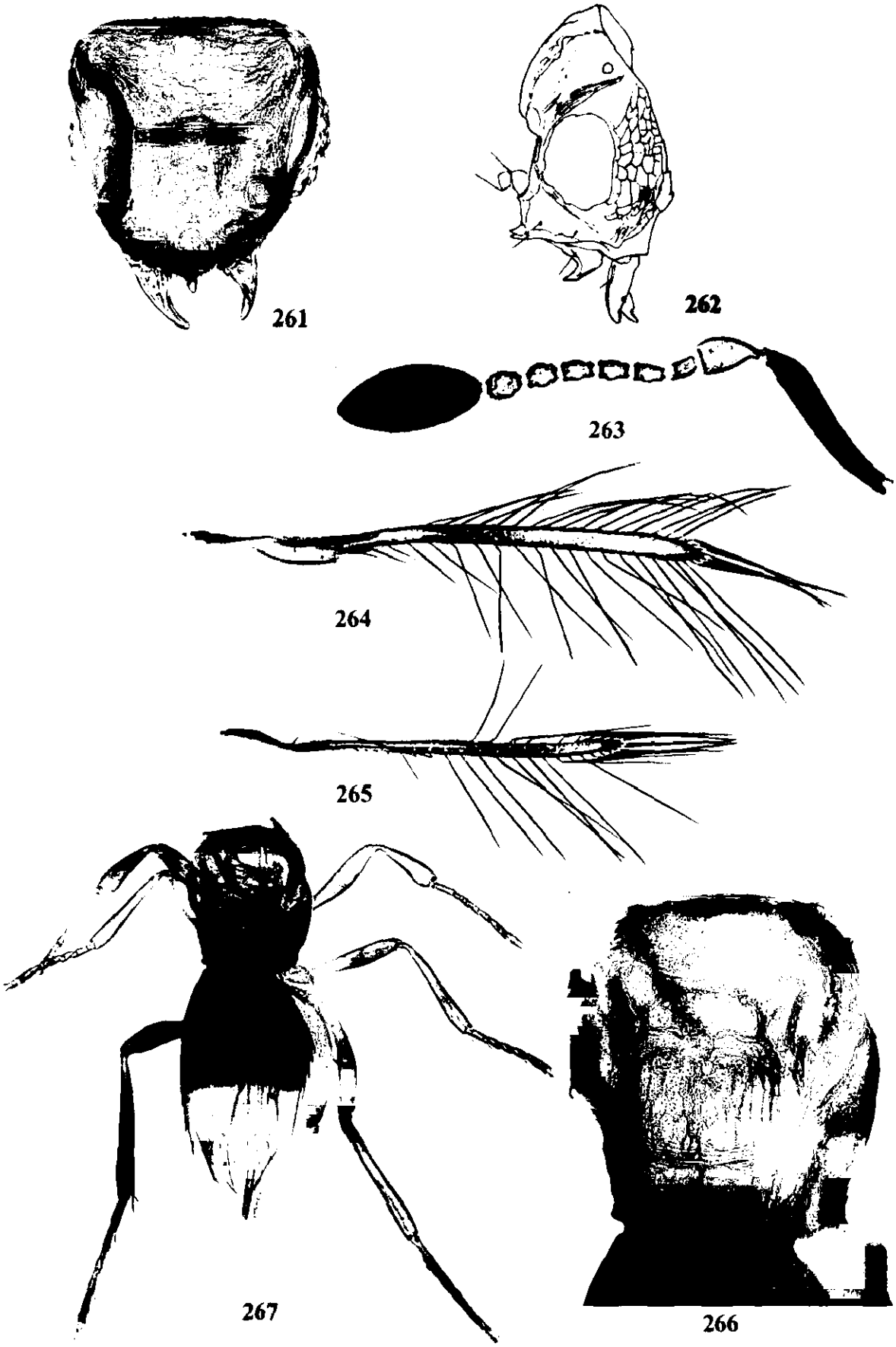
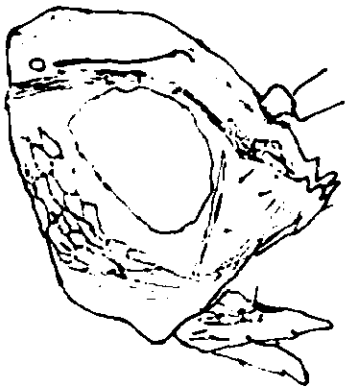
Figures 254–260 *Litus assamensis* sp. nov. Female (Holotype): 254, head; 255, antenna; 256, fore wing; 257, fore wing basal part enlarged; 258, hind wing; 259, mesosoma, lateral; 260, mesosoma and metasoma, lateral.



Figures 261–267 *Litus huberi* Rehmat & Anis. Female (Holotype): 261, head showing mandibles; 262, head, dorso-lateral view; 263, antenna; 264, fore wing; 265, hind wing; 266, scutellum and propodeum showing sculpture, dorsal lateral view; 267, mesosoma and metasoma, dorsal.



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Figures 268–272 *Litus triapitsyni* Rehmat & Hayat. Female (Holotype): 268, head, dorso-lateral view; 269, antenna; 270, fore wing; 271, hind wing; 272, mesosoma and metasoma, dorso-lateral view.

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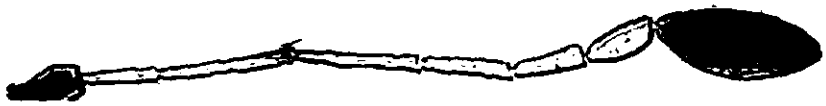

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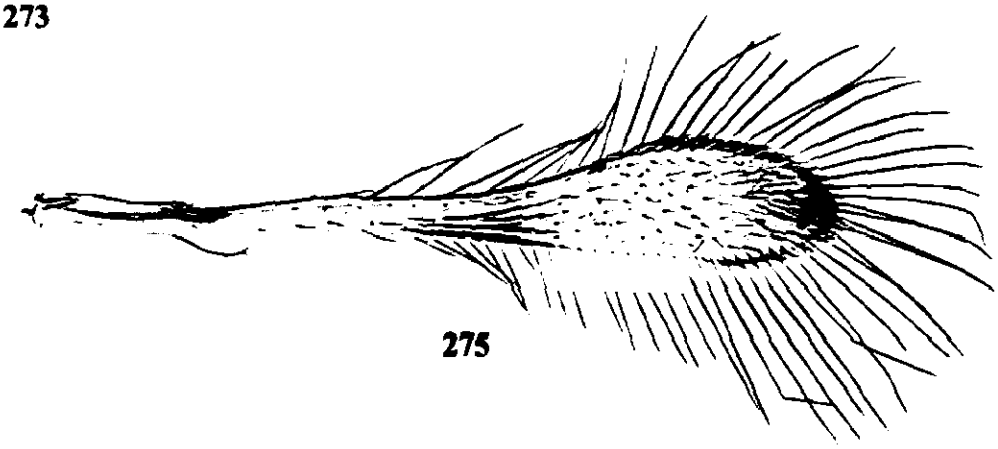

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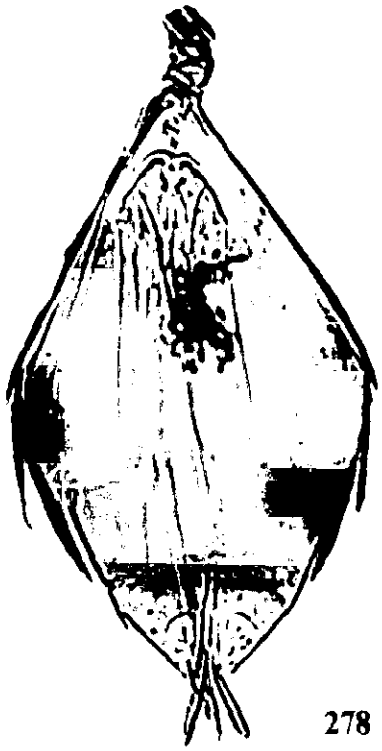

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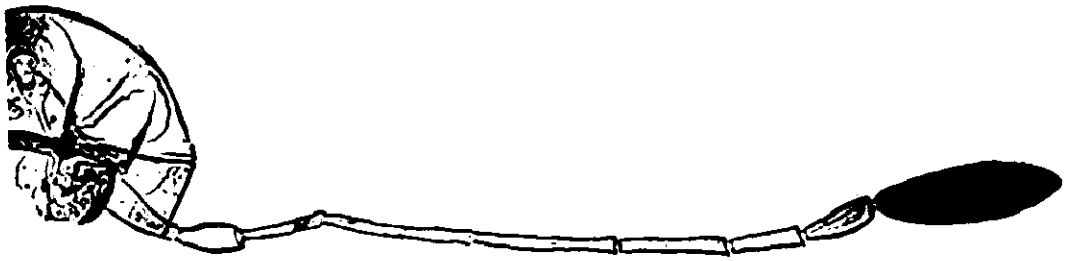
Figures 273–278 *Palaeoneura sophoniae* Huber. Female: 273, head, frontal; 274, antenna; 275, fore wing; 276, hind wing; 277 mesosoma, 278, metasoma.



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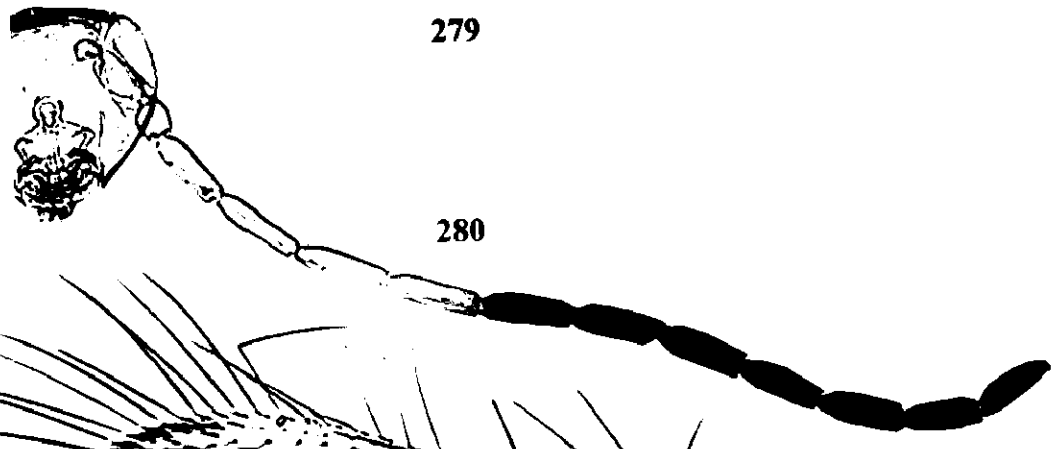

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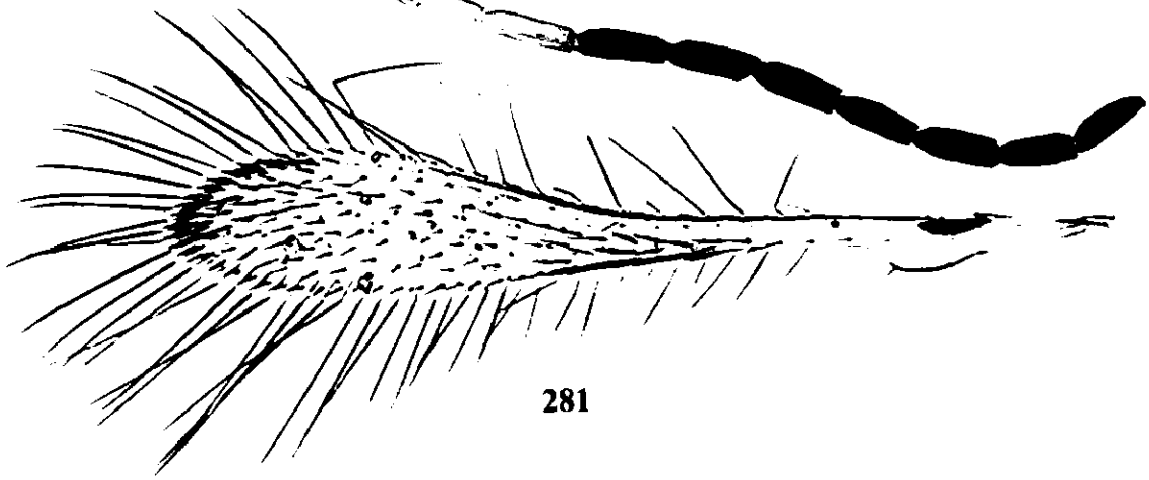

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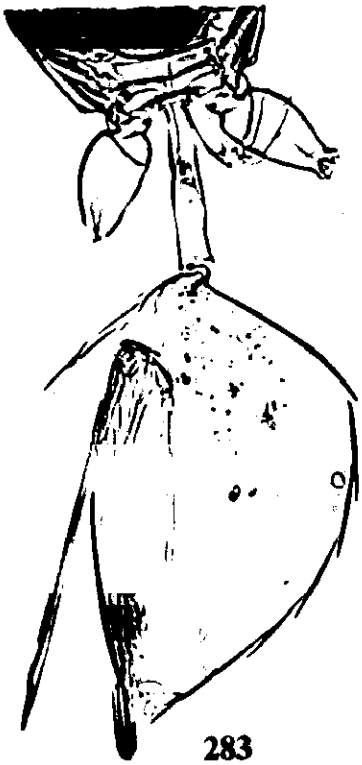

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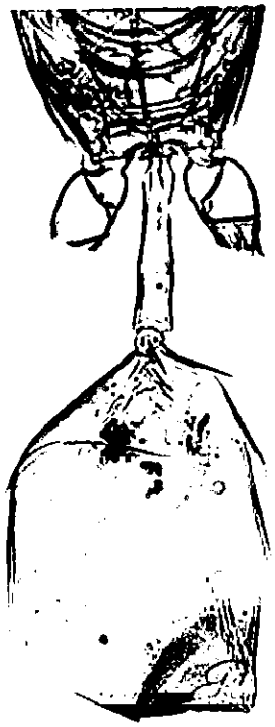

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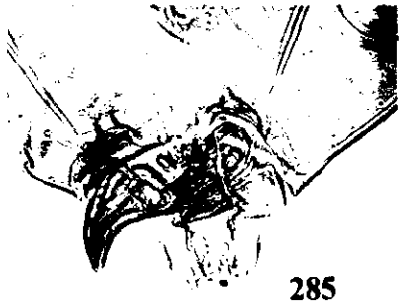
Figures 279–284 *Palaeoneura bagicha* (Narayanan, Subba Rao & Kaur). Female: 279, antenna; 281, fore wing; 282, mesosoma, dorsal, 283, metasoma showing ovipositor; Male: 280, antenna; 284, metasoma showing genitalia.



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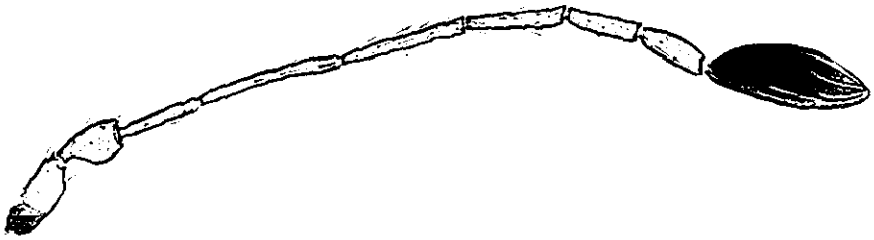

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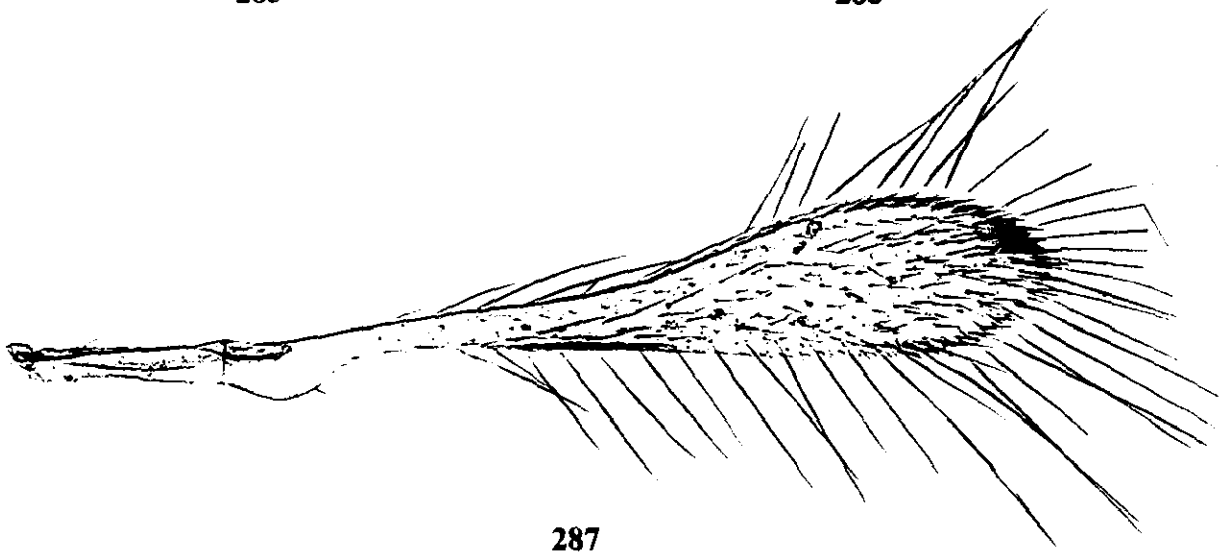

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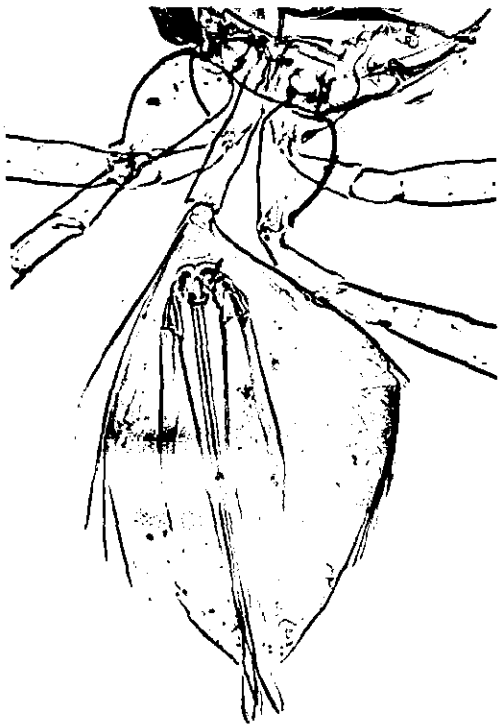

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Figures 285–289 *Palaeoneura indopeninsularis* (Mani & Saraswat). Female: 285, mandibles; 286, antenna; 287, fore wing; 288, mesoscutum and scutellum; 289, metasoma showing ovipositor.

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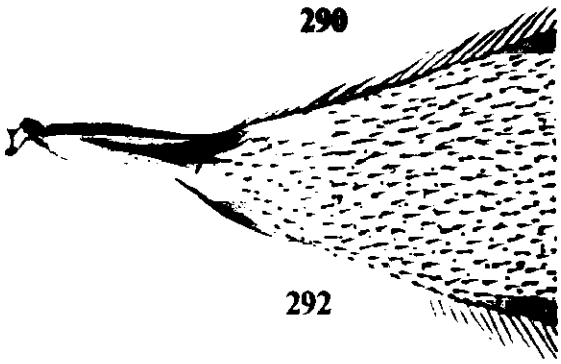

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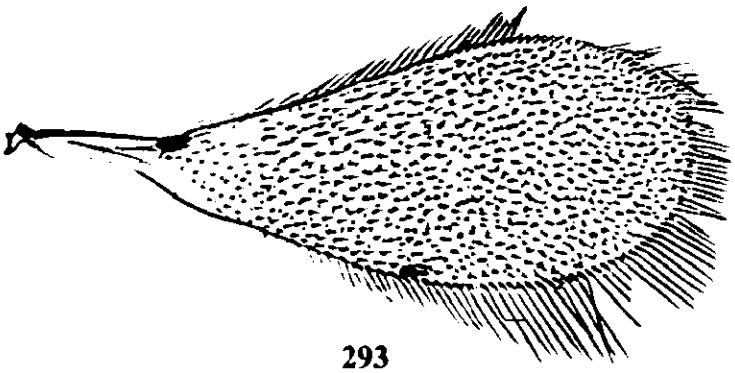

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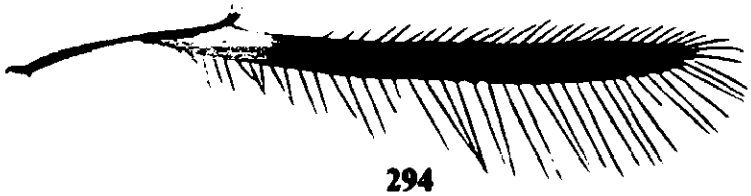

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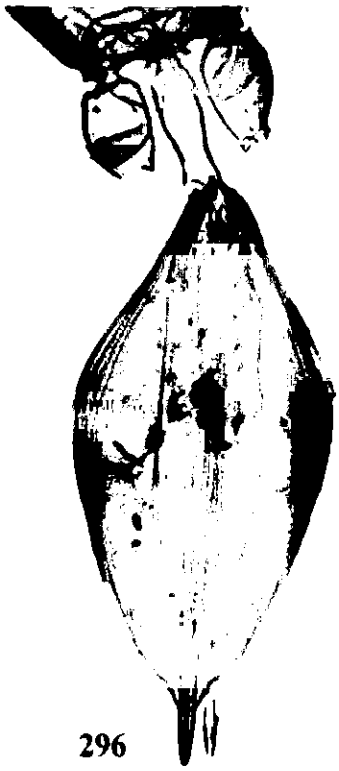

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Figures 290–296 *Polynema (Doriclytus) alalata* sp. nov. Female (Holotype): 290, head, frontal; 291, antenna; 293, fore wing; 292, fore wing basal part enlarged; 294, hind wing; 295, mesosoma, dorsal; 296, metasoma showing ovipositor.

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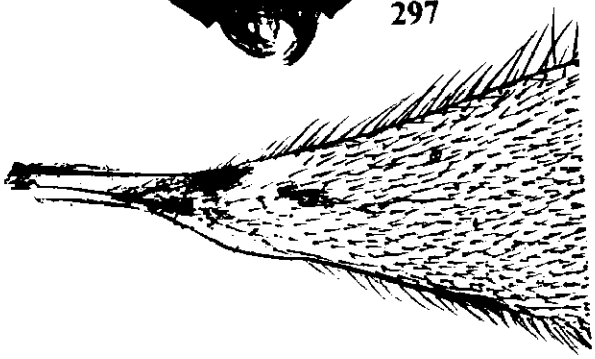

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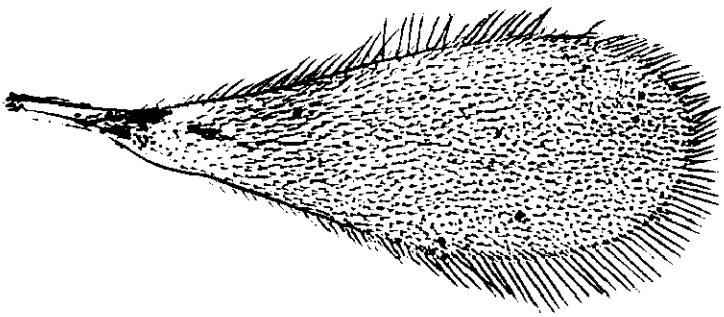

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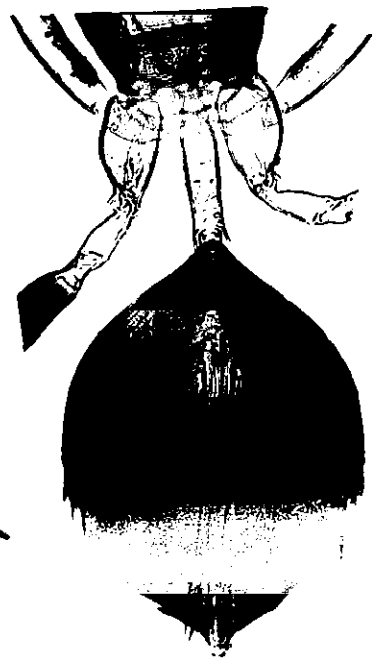

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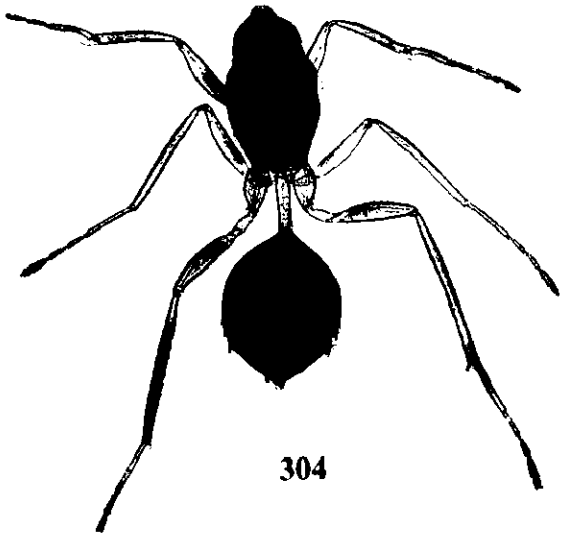

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Figures 297–304 *Polynema (Doriclytus) bicolorigastra* sp. nov. Female (Holotype): 297, head, frontal; 298, antenna; 299, fore wing basal part enlarged; 300, fore wing; 301, mesosoma, dorsal; 302, prosternum closed by propleura; 303, metasoma showing ovipositor; 304, mesosoma and metasoma, dorsal.

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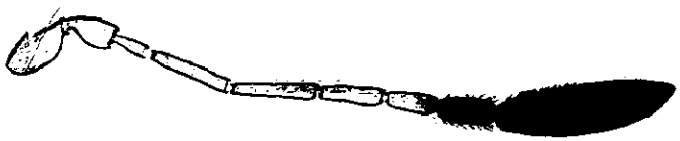

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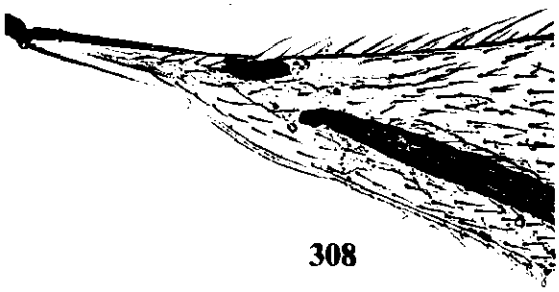

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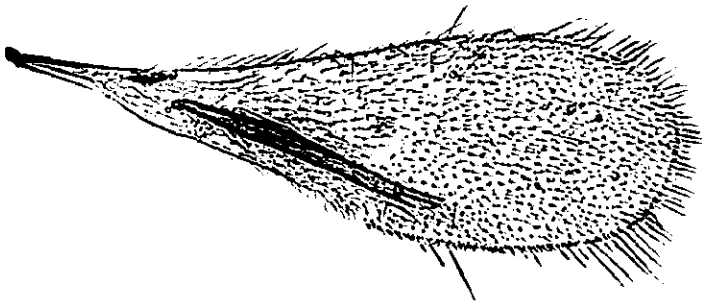

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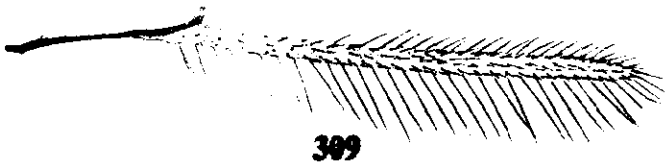

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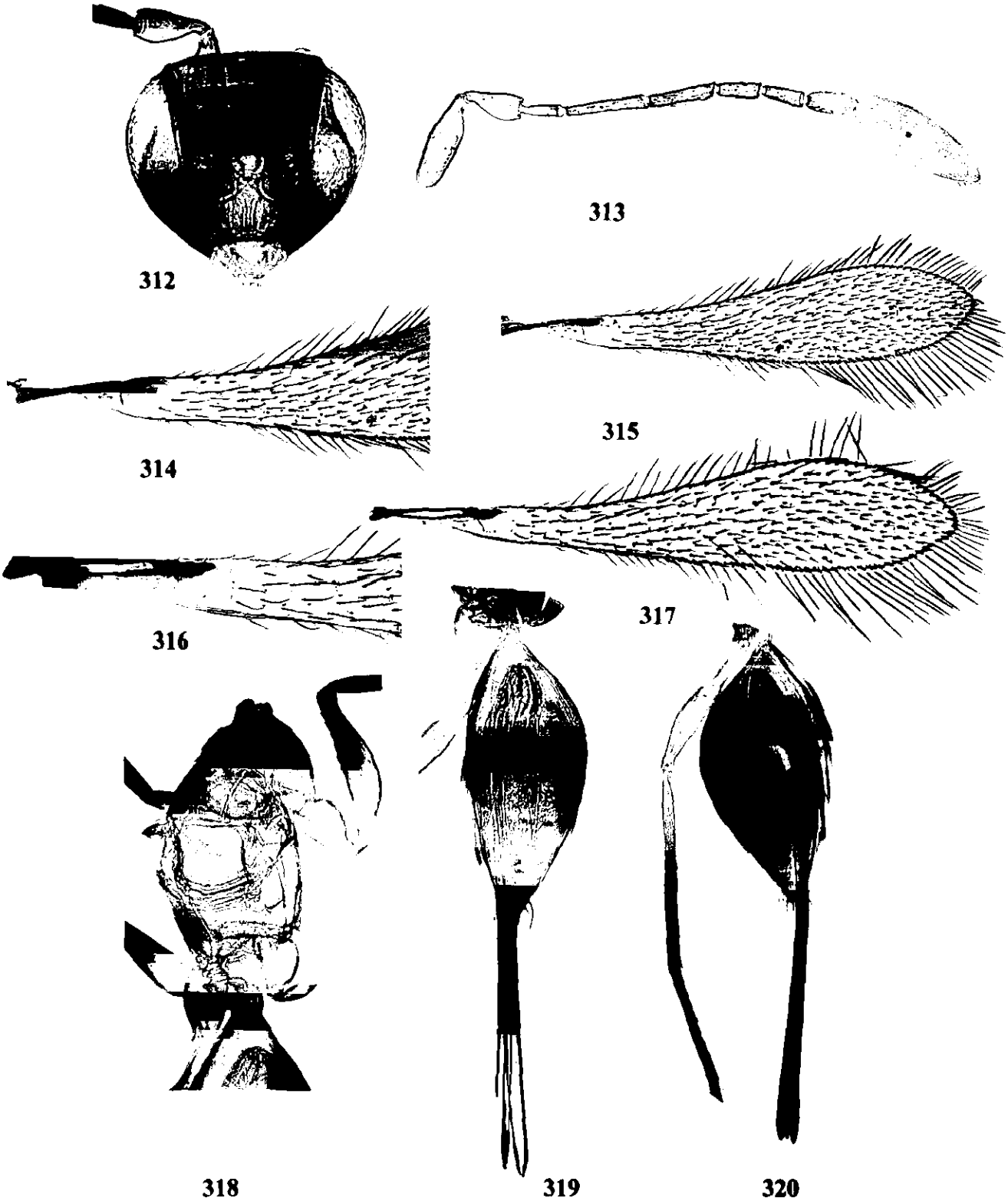
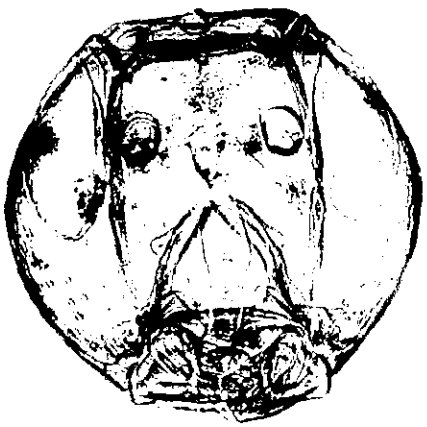
Figures 305–311 *Polynema (Doriclytus) dunense* Hayat & Anis. Female: 305, head, frontal; 306, antenna; 307, fore wing; 308, fore wing basal part enlarged; 309, hind wing; 310, mesosoma, dorsal; 311, metasoma showing ovipositor.



Figures 312–320 *Polynema (Doripolynema) mendeli* Girault. Female (Assam): 312, head, frontal; 313, antenna; 314, fore wing; 315, fore wing basal part enlarged; 318, mesosoma, dorsal; 319, metasoma showing ovipositor; Female (Kerala): 316, fore wing; 317, fore wing basal part enlarged; 320, metasoma showing ovipositor



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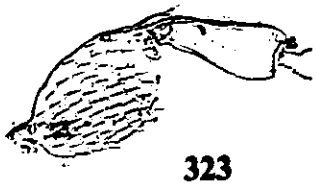

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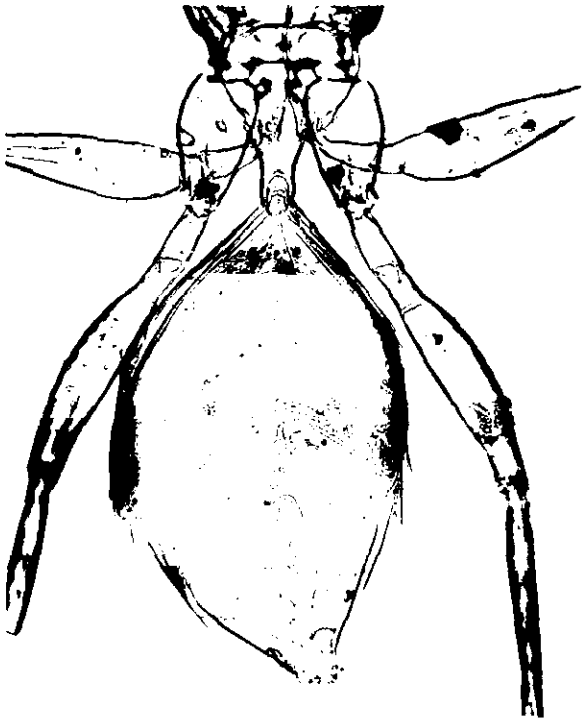

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Figures 321–324 *Polynema (Doripolynema) mendeli* Girault. Male: 321, head, frontal; 32 antenna; 323, scape enlarged showing peg-like sensillae; 324, metasoma showing genitalia.

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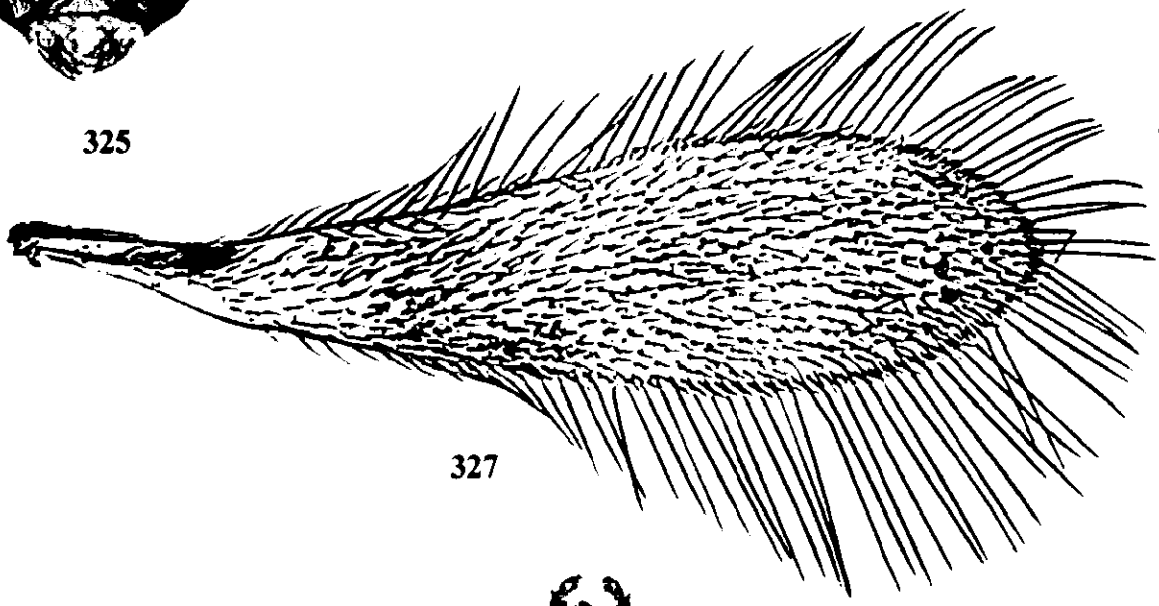

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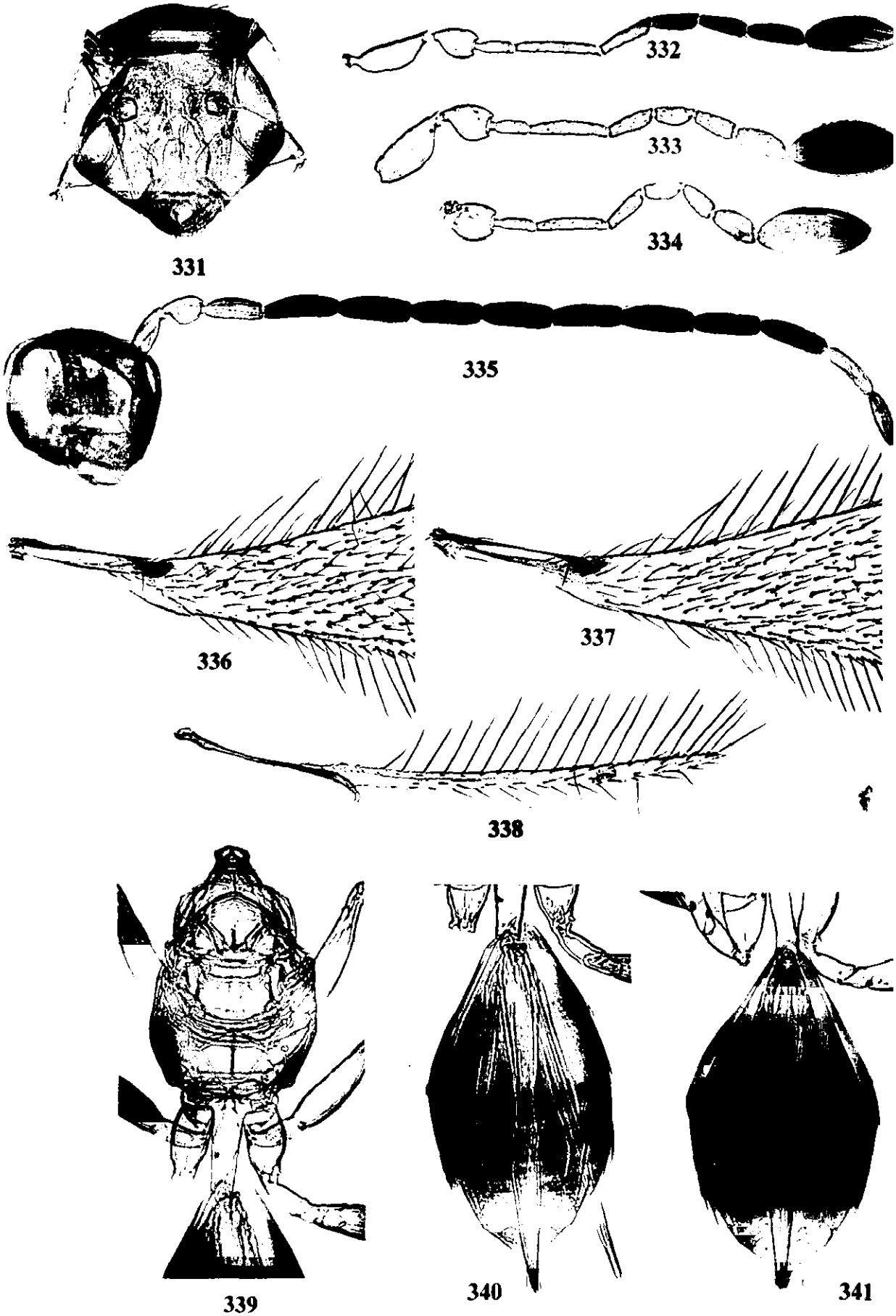
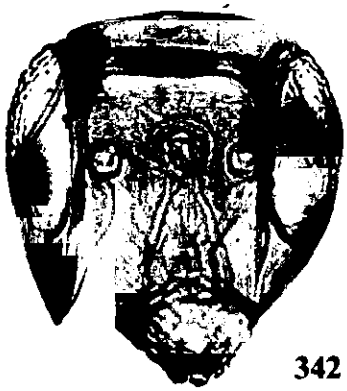
Figures 325–330. *Polynema (Polynema) manaliense* Hayat & Anis. Female: 325, head frontal; 326, antenna; 327, fore wing; 328, mesosoma, dorsal; 329, prostermun open b propleura; 330, metasoma showing ovipositor.



Figures 331–341. *Polynema (Polynema) brevicarinae* Annecke & Doutt. Female: 331, h frontal; 332–334, antennae; 336, 337, fore wings basal part enlarged; 338, hind wing; mesosoma, dorsal; 340, 341, metasoma showing exserted ovipositor. Male: 335; antenna.



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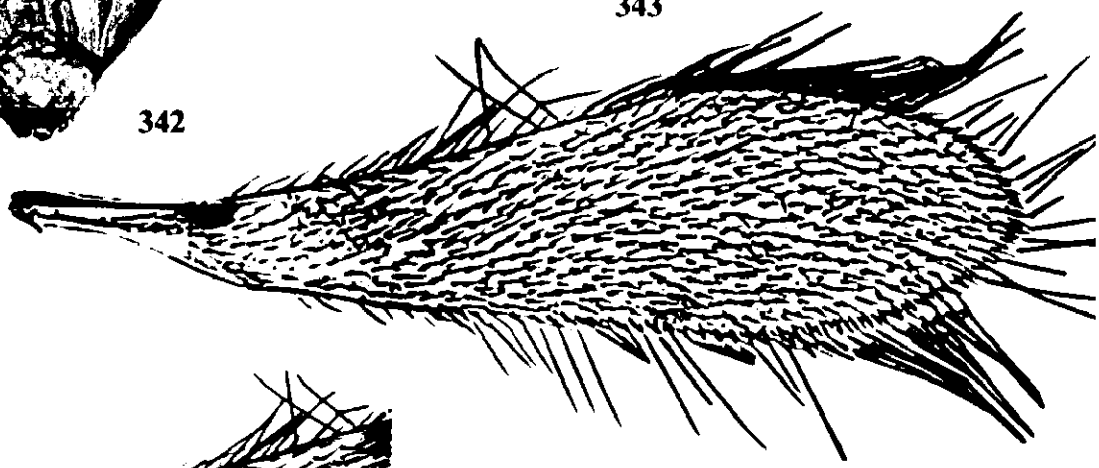

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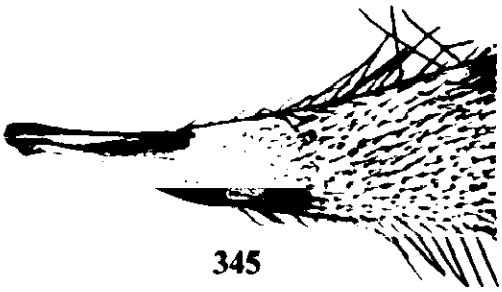

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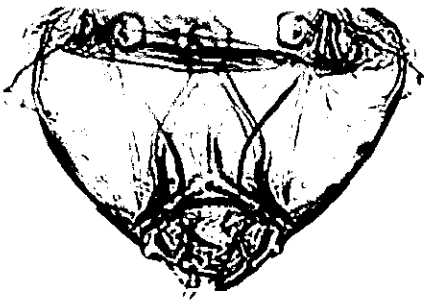
Figures 342–347. *Polynema (Polynema) kamathi* Mani & Saraswat. Female: 342, hea frontal; 343, antenna; 344, fore wing; 345, fore wings basal part enlarged; 346, mesosom dorsal; 347, metasoma showing ovipositor.



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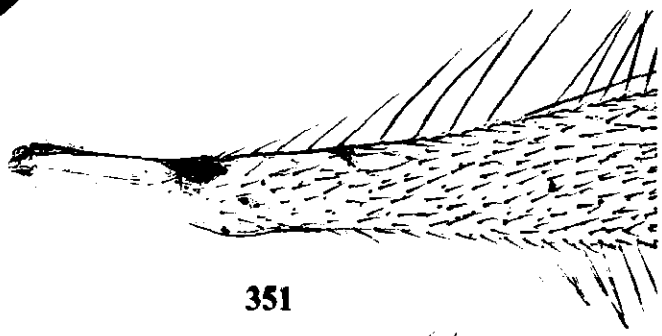

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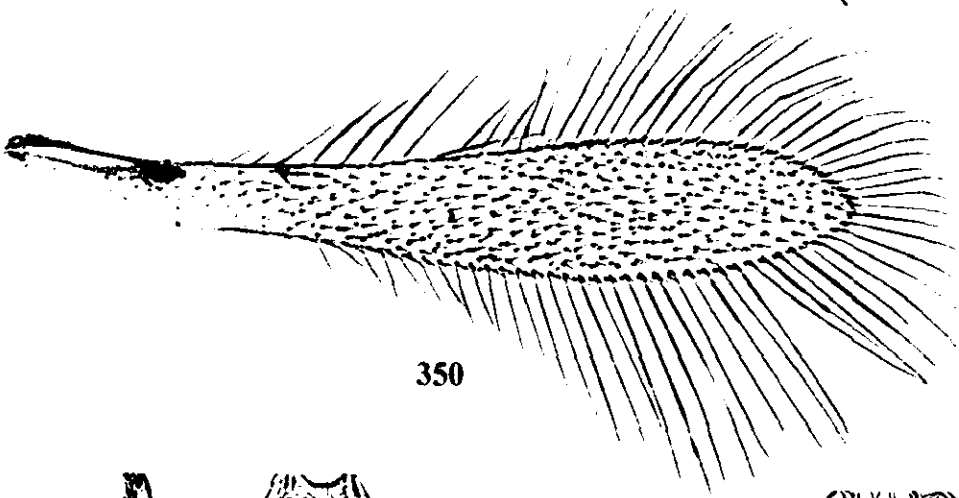

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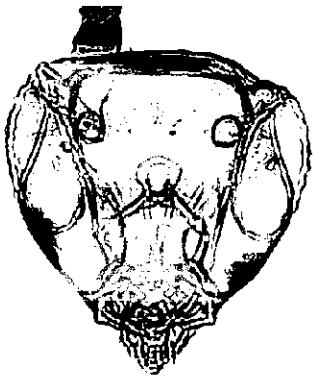
Figures 348–353. *Polynema (Polynema) hayati* sp. nov. Female (Holotype): 348, he frontal; 349, antenna; 350, fore wing; 351, fore wings basal part enlarged; 352, mesosor dorsal; 353, metasoma showing ovipositor.



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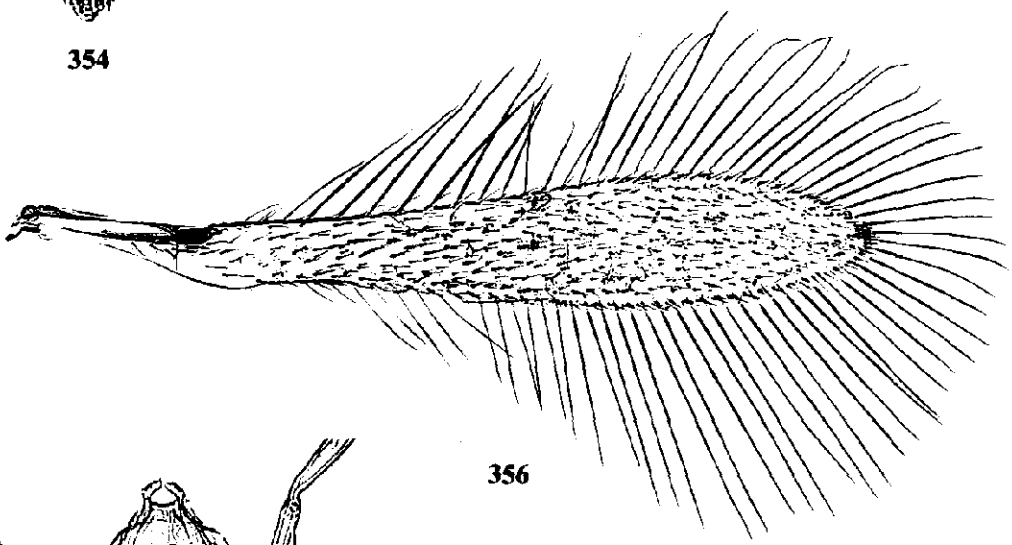

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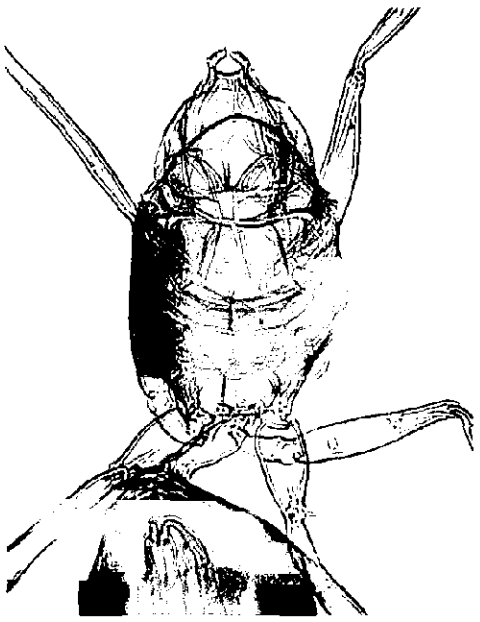

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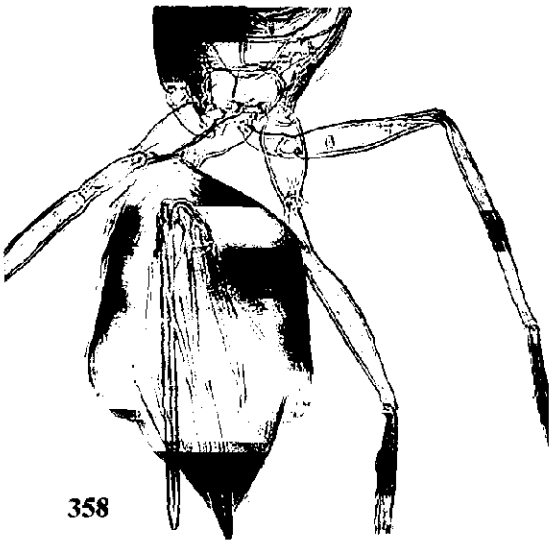

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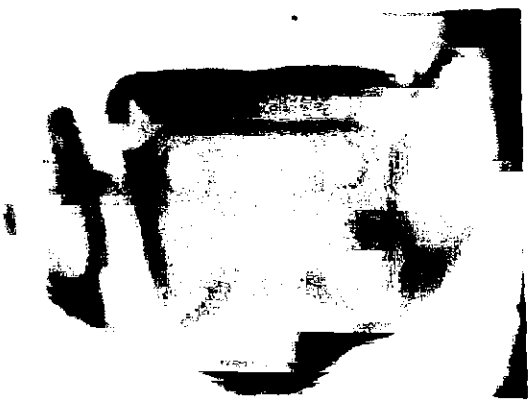
Figures 354–358. *Polynema (Polynema) bengalense* sp. nov. Female (Holotype): 354, head frontal; 355, antenna; 356, fore wing; 357, mesosoma, dorsal; 358, metasoma showing ovipositor.



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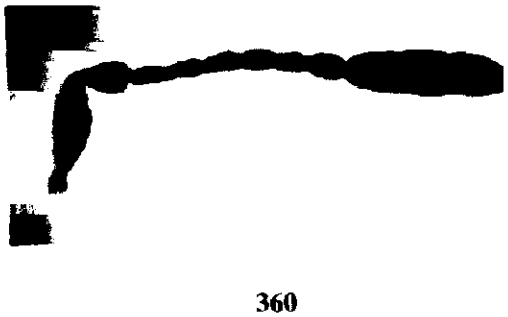

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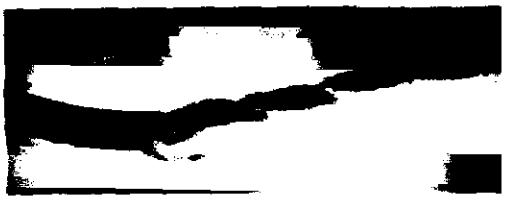

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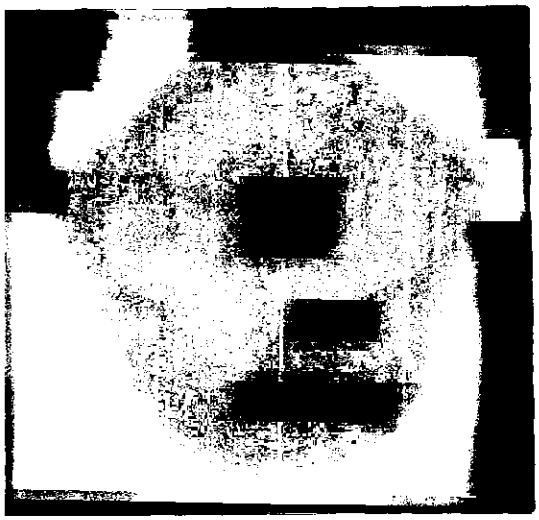

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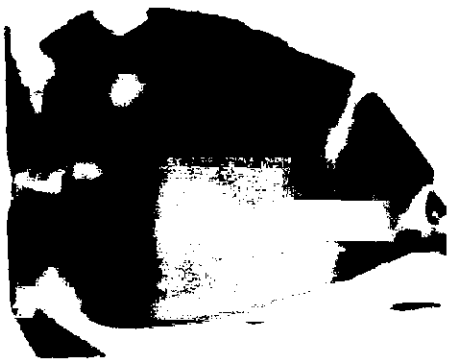

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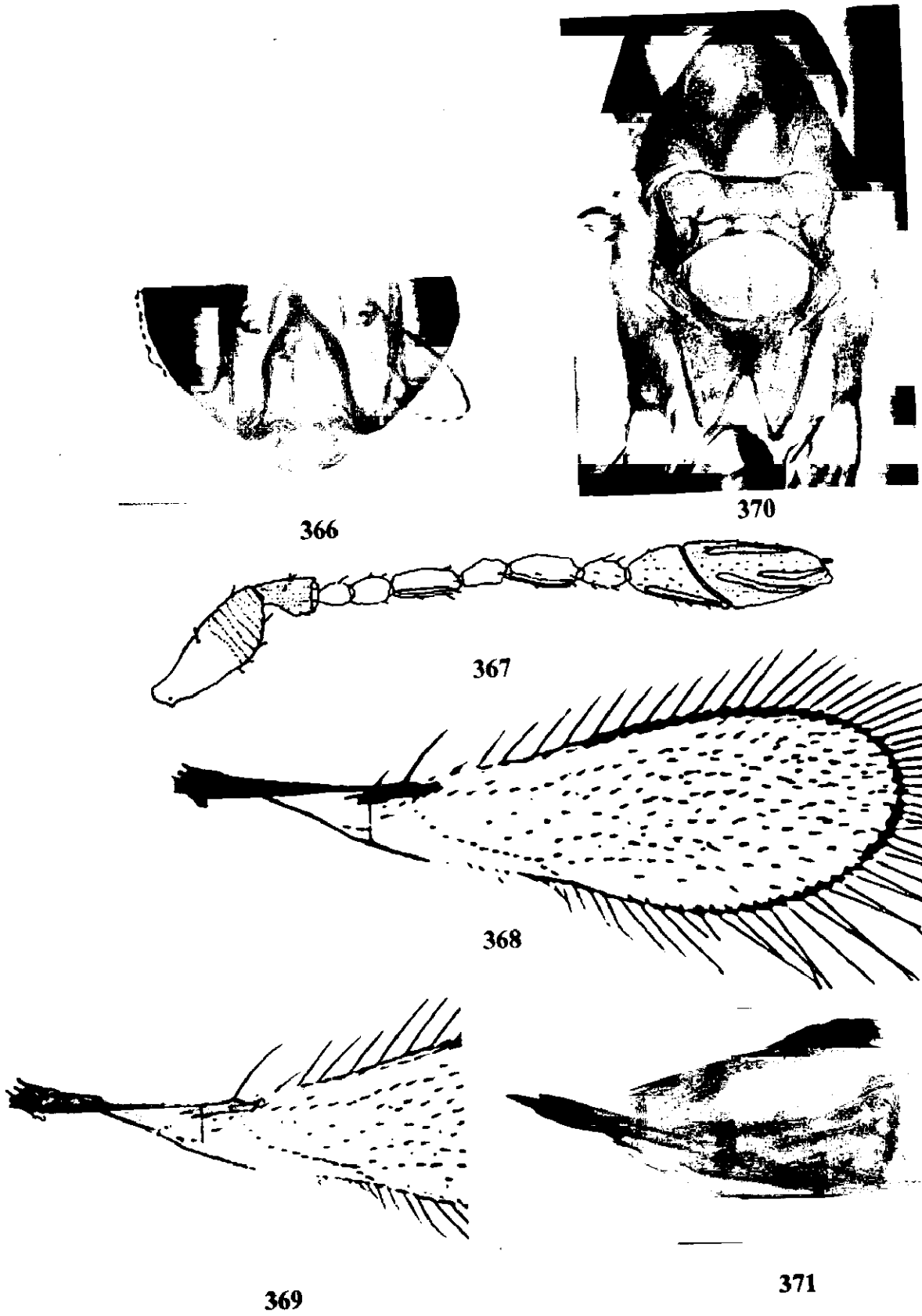
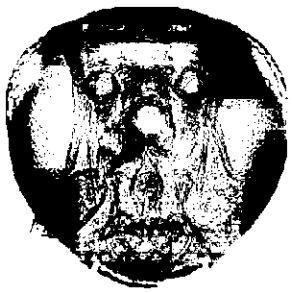
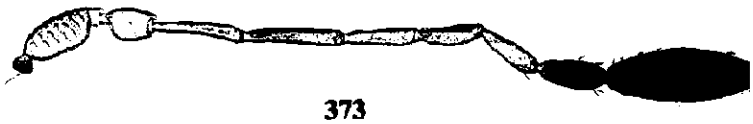
Figures 359–365. *Pseudanaphes sikkimianus* Rehmat & Anis. Female: 359, head, front 360, antenna; 361, fore wing; 362, hind wing; 363, mesosoma, dorsal; 364, tarsal segmer 365, metasoma showing ovipositor.



Figures 366–371. *Schizophragma indica* Rehmat & Anis. Female: 366, part of head, fro showing mandibles; 367, antenna; 368, fore wing; 369, fore wing basal part, 370, mesosc dorsal showing mesophragma; 371, metasoma showing ovipositor.





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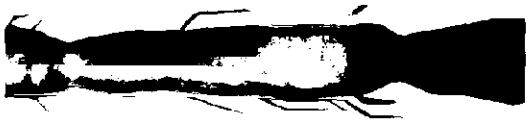

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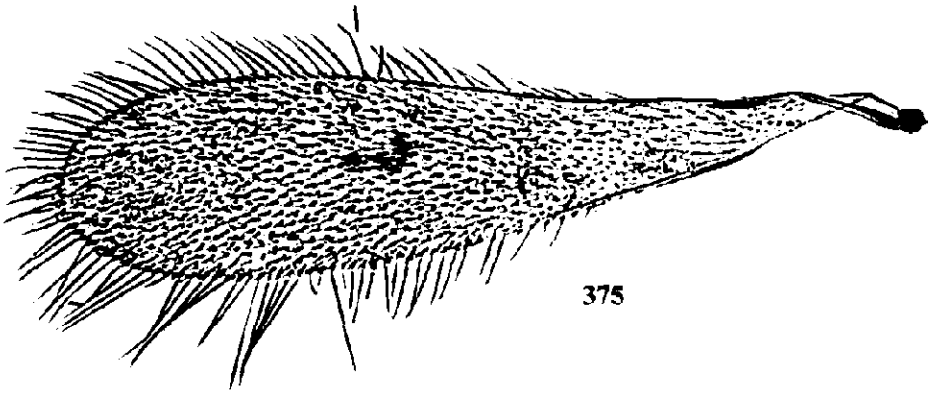

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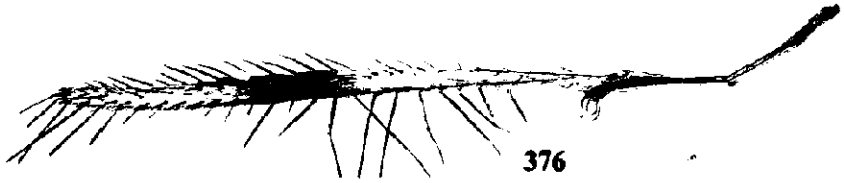

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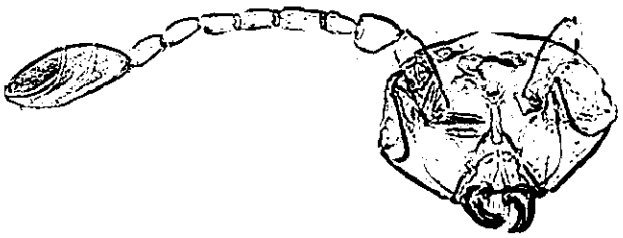
Figures 372–378 *Stephanodes reduvioli* (Perkins). Female: 372, head, frontal; 373, antenn 374, antennal segment showing sensilla; 375, fore wing, 376, hind wing; 377, mesosom dorsal.; 378, metasoma showing ovipositor.



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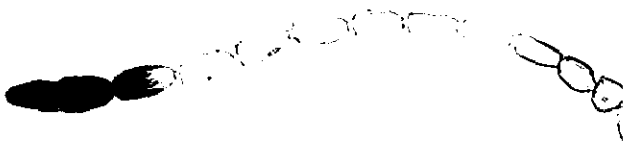

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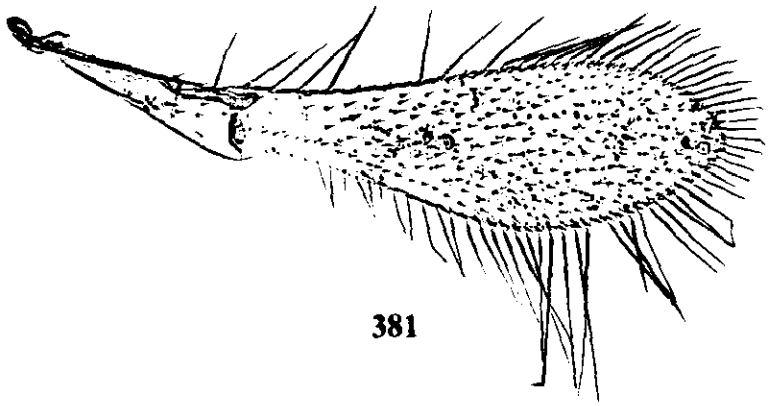

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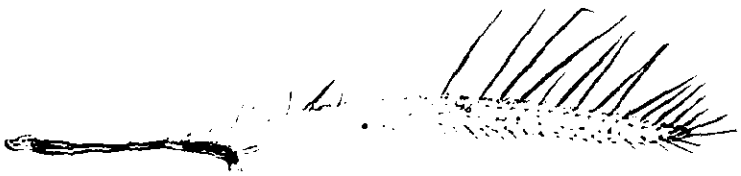

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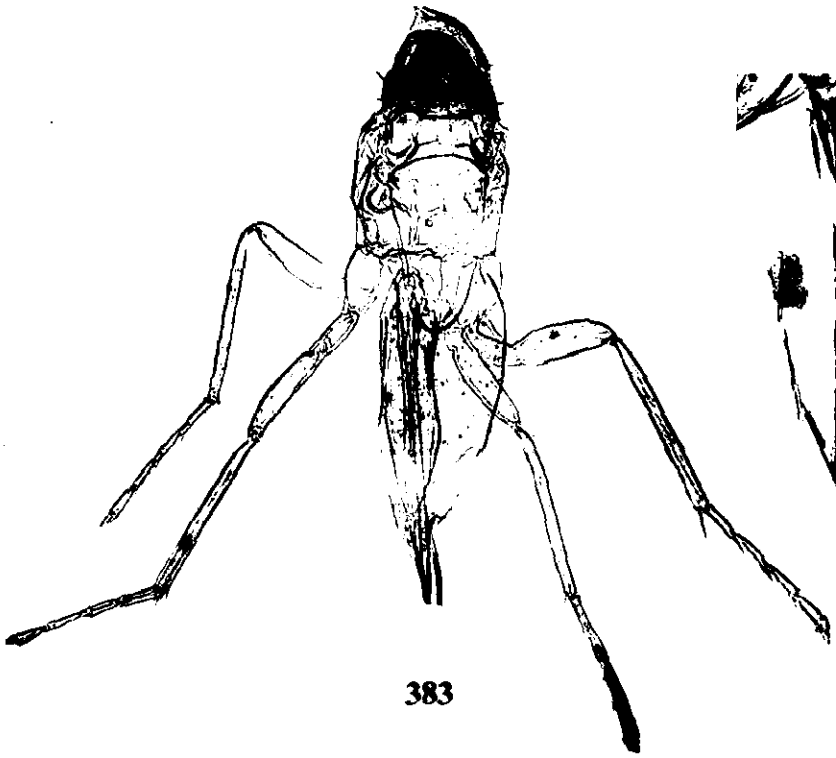

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Figures 379–384. *Stethynium empoascae* Subba Rao. Female: 379, head with antenna; 381, fore wing, 382, hind wing; 383, mesosoma and metasoma, dorsal. Male: 380, antenna; 384, metasoma showing genitalia.

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Record of Genus *Schizophragma* Ogloblin (Hymenoptera: Mymaridae) in Oriental region, with description of a new species from India

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(Received 9 January 2014; accepted 8 December 2014)

The mymarid genus *Schizophragma* Ogloblin from the Oriental region is recorded and a new species, *Schizophragma indica* **sp. nov.**, is described. A checklist of species of the genus along with their hosts and distribution is also included.

http://zoobank.org/urn:lsid:zoobank.org:pub:1FF6909B-EA08-49E1-86C7-67AC3043CD0F

Keywords: Mymaridae; Chalcidoidea; new record; new species; India

Introduction

The genus *Schizophragma* Ogloblin (1949) belongs to the *Anagrus* group of genera in the Mymaridae. As noted by Huber (1987), it is known from seven species, occurring in the Nearctic and Neotropical regions, in the western hemisphere. Lin et al. (2007) reported an undescribed species from Australia. This study documents new record of this genus from the Oriental region, and describes a new species from India. A checklist of its species along with their known hosts and distribution is also included. The voucher material has been deposited with the Insect Collections, Department of Zoology, Aligarh Muslim University, Aligarh, India (ZDAMU).

Materials and methods

Specimens were collected by sweeping, dissected and mounted in Canada balsam on a microslide as given by Noyes (1982). The measurements of body length are given in millimetres; all other measurements are relative, taken with an ocular micrometer. The following abbreviations are used: F1, F2 and F3: funicle segments; T1, T2 and T3: gastral tergum; ZDAMU: Insect Collections, Department of Zoology, Aligarh Muslim University, Aligarh, India.

A. The genus *Schizophragma* Ogloblin

Schizophragma Ogloblin 1949:345. Type species *Schizophragma basalis* Ogloblin, by original designation.

Schizophragma Ogloblin; Annecke 1961:21–23. As subgenus of *Patasson* Walker (= *Anaphes* Haliday).

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Diagnosis

Female

Head and mesosoma dark brown; metasoma, either completely dark brown or with some segments yellow to white. Face with subantennal sulci indistinct or absent; and antennal torulus separated from transverse trabecula utmost by slightly more than its own diameter. Antennal formula 1162; radicle fused with scape; scape with transverse ridges; funicle with longitudinal sensilla on one to five segments; two-segmented clava , proximal and distal segments with longitudinal sensilla. Mandible with four sharp teeth. Pronotum divided medially; mesoscutum with notauli distinct; scutellum divided into anterior and posterior parts, the anterior with 1 + 1 setae near circular pits; posterior scutellum distinctly striated, and divided longitudinally; propodeum with a pair of setae; and mesophragma with a deep or a shallow notch. Forewing moderately broad with disc densely setose; variable number (2–40) of setae present behind marginal and stigmal veins; venation not reaching half length of wing; and proximal macrochaeta shorter than distal ones. Tarsi with four segments. Gaster with T6 small (Figure 6). Ovipositor with second valvifers enlarged basally, and slightly exerted; and hypopygium not reaching to apex of gaster.

Male

Antenna with 11-segmented flagellum. Genitalia relatively small, simple and encapsulated (Huber 1987, Figure 29).

Hosts

The recorded hosts (eggs) belong to the Membracidae (Hemiptera).

Distribution

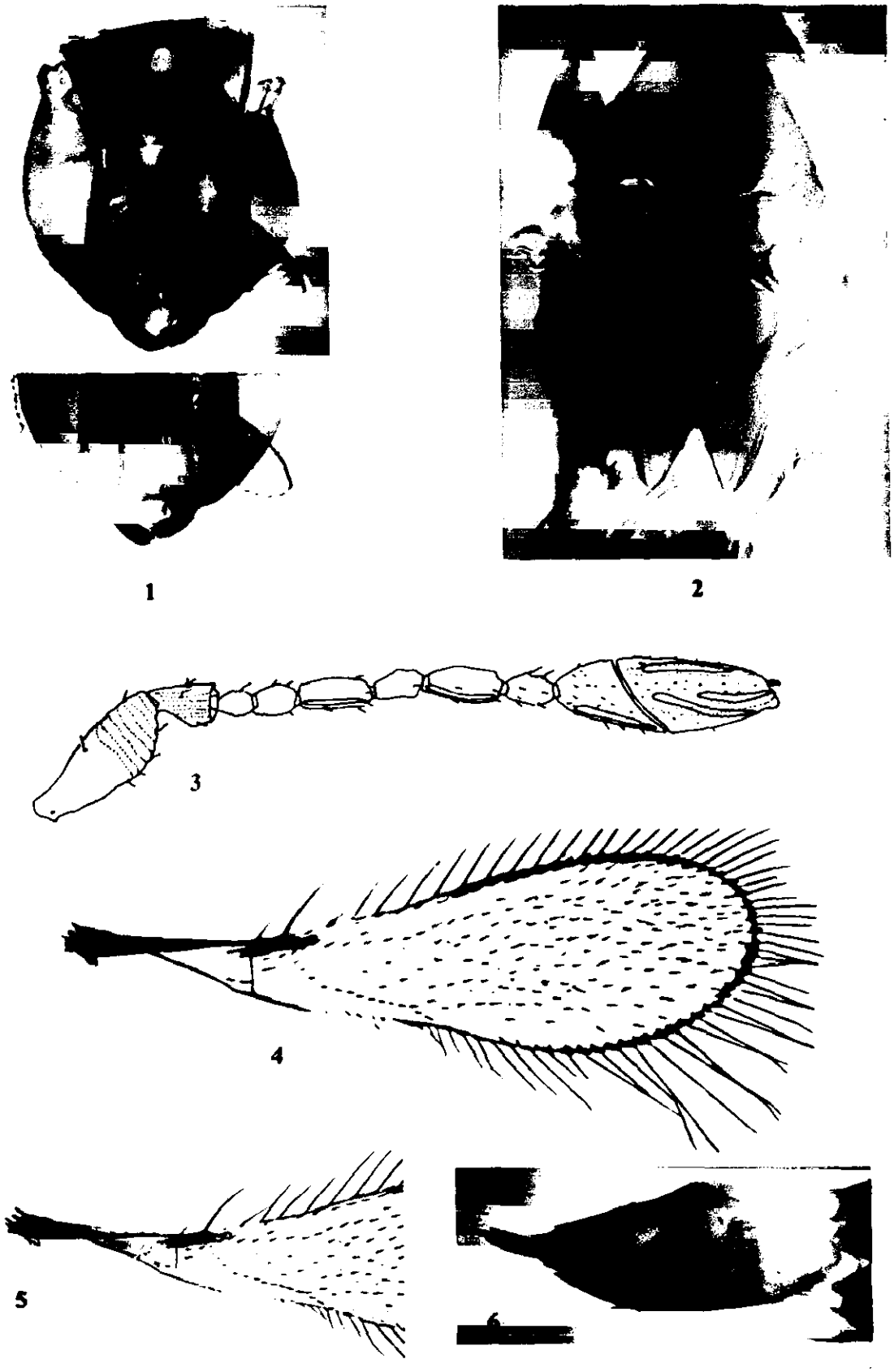
Schizophragma contains seven described species distributed in the Nearctic and Neotropical regions (Huber 1987). It is also known as an undescribed species from Australia (Lin et al. 2007) which appears to be conspecific with *Schizophragma indica* described herein.

Comments

As noted by Huber (1987), *Schizophragma* is close to *Stethynium* Enock, but differs in a two-segmented clava (except entire in *Schizophragma saltensis* Ogloblin), presence of one pair of setae on anterior scutellum, mesophragma variously notched at apex, and largely dark brown, and in the male by the encapsulated genitalia. In *Stethynium*: three-segmented clava with sutures obliquely curved, anterior scutellum without setae, mesophragma with apex rounded, body usually yellow with some parts with brown suffusions, and male genitalia complex and non-encapsulated.

B. Checklist of species

1.	*basalis* Ogloblin 1949:345–350 Host: *Acanophora sp.* (Hemiptera: Membracidae)	Argentina
2.	*bicolor* (Dozier) *Anaphes bicolor* Dozier 1932:88; Huber 1987:834 *Stethynium annulatum* Doutt 1947:152–154	Haiti, Mexico St. Kitts and Nevis Puerto Rico, USA



Figures 1–6. *S. indica* **sp. nov.,** female: 1, head – frontal; 2, mesosoma – dorsal; 3, antenna; 4, forewing, 5, forewing-basal part; 6, metasoma – lateral view.

3.	*latipennis* (Crawford) *Anaphoidea latipennis* Crawford 1913:343–352 Hosts: *Horiola arcuata* (F.), *Horiola picta* Coquebert, *Campylenchia hastat* (F.) *Vanduzea* sp. (Ogloblin 1949; Huber 1987)	Costa Rica, Panama Trinidad
4.	*parvula* Ogloblin 1949:355–356. *Schizophragma nana* Ogloblin 1949:356–358; Huber 1987:839	Argentina
5.	*peruana* Ogloblin 1949:353–355	Peru
6.	*saltensis* Ogloblin 1949:352–353	Argentina Trinidad
7.	*squamosa* Ogloblin 1949:350–352	Argentina

C. *S. indica* sp. nov. (Figures 1–6)

Description

Female

Head and mesosoma dark brown; metasoma with T1 and partly T2 white, T3–5 dark brown, the band-like T6 nearly black, T7 white; antenna yellow, dorsal margin of scape and pedicel brownish yellow, and clava brown. Wings hyaline. Legs, including coxae pale yellow.

Head

Vertex with fine rugose reticulate sculpture, with two setae in ocellar triangle (= stemmaticum), a seta each on sides, and in front of anterior ocellus; face with a pair of long, bristle-like setae apart from three setae each on sides of face and two pairs between the bristles and mouth margin (Figure 1). Antenna with scape about as long as pedicel, F1 and F2 combined, with seven or eight transverse ridges on inner surface; pedicel almost as long as F3; F1 and F2 shorter than F3; F3 3 × as long as broad and longer than F4; F5 subequal in length to F3 and longer than F6; clava as long as F1–4 combined, two segmented, with suture oblique; longitudinal sensilla on F3 (one), F5 (one), first segment of clava (1) and second segment of clava (5) with a modified seta at apex (Figure 3). Length and width of antennal segments: scape – 28:13; pedicel – 14:6.5; F1, 7:5; F2, 8.5:5; F3, 15:5; F4, 10:5; F5, 15:6; F6, 10:6; clava – 43.

Mesosoma

Midlobe of mesoscutum subequal in length to scutellum (35:36), with largely longitudinally lineolate reticulate sculpture except anterior fifth where the sculpture consist of transversely elongate cells; posterior scutellum 1.7 × as long as its anterior part, with lineolate reticulate sculpture; midlobe with two setae; each side lobe with one seta; anterior scutellum with two setae; metanotal dorsellum with rounded posterior margin, and with one small seta on each side of dorsellum; propodeum with one seta behind each spiracle; and mesophragma with deep, angular notch (Figure 2). Forewing 3.83 × as long as broad; longest seta of marginal fringe 0.71 × wing width (Figure 4); venation and discal setation as in Figure 5. Hindwing, only one hindwing available; disc with one row of setae along anterior margin, and two rows along posterior margin; longest seta of marginal fringe about 3.8 × as long as wing width. Foretibia with two rows of four or five, and four spine-like setae; length of mesotibia – 63, mesotarsus – 65; metatibia –68 and metatarsus – 70.

Metasoma 1.36 × as long as mesosoma; ovipositor extending from base of gaster and shortly exerted; and second valvifer basally enlarged (Figures 6). Length – mesosoma + metasoma 0.58 mm.

Holotype

f, India: Uttar Pradesh: Balrampur: Sesai Ghat, 6.x.2006, Coll. FR Khan, on slide under three cover slips (ZDAMU, Registration No. HYM.CH.637); *paratypes*. 3 f, India: Uttar Pradesh: Sesai Ghat, 6.x.2006, on slides; f, Uttar Pradesh: Mathura: Barari, 29.viii. 2007, Coll. FR Khan, on slide (ZDAMU-4, Registration No. HYM.CH.637)

Etymology

The new species name is derived from 'India' from where it was collected.

Comments

This new species runs to *Schizophragma parvula* in the key to species given by Huber (1987), but differs in the following characteristics: the presence of deep Λ-shaped notch in mesophragma; presence of about seven setae behind marginal vein, U-shaped arrangement of setae behind stigmal vein; relatively shorter F1 and F2, and longer F3 and F5; clava as long as F1–4 combined. In *S. parvula*: mesophragma with a small notch at apex; utmost six setae behind marginal vein and setae absent behind stigmal vein; relatively longer F1 and F2 (F1, 1.66–2.0 × ; F2, 1.84–2.4 ×) and relatively shorter F3 and F5 (F3, 2.11–2.42 × ; F5, 1.66–1.7 ×); and clava shorter than F1–4 combined (based on description and figures in Ogloblin 1949).

This new species resembles *Schizophragma latipennis* and *S. basalis*, in deep Λ-shaped notch in mesophragma, but these two have longitudinal sensilla on F2, F3, F5 and F6 (Huber 1987).

In ZDAMU collections, a single male with the date same as the holotype is available but it has a small tooth in the middle of the posterior margin of dorsellum of metanotum, as in the female of *Schizophragma peruana* (Ogloblin 1949, Figure 13). Therefore, this male is not considered conspecific with the female, and not included in the material.

Acknowledgements

The authors thank Dr M. Hayat, Aligarh Muslim University for reviewing the manuscript and giving valuable suggestions; The authors are grateful to the Chairman, Department of Zoology, Aligarh Muslim University, Aligarh for providing facilities.

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RECORD OF SOME SPECIES OF MYMARIDAE FROM INDIA (HYMENOPTERA: CHALCIDOIDEA), WITH DESCRIPTION OF TWO NEW SPECIES

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Abstract. *Alaptus jowainus* **sp. nov.** and *Camptoptera assamensis* **sp. nov.** (Hymenoptera: Mymaridae) are described, and seven known species are recorded in the genera *Camptoptera*, *Himopolynema* and *Stethynium* from India. *Comptoptera sakaii* Taguchi is redescribed as it is newly recorded from India.

Key words. *Alaptus*, *Camptoptera*, new species, records, India.

Introduction

This paper deals with a small collection of fairyflies (Hymenoptera: Mymaridae) made in recent years from the north and north eastern States of India. We describe here two new species, one each in *Alaptus* Westwood and *Camptoptera* Foerster, and record 7 species in the genera *Camptoptera*, *Himopolynema* Taguchi and *Stethynium* Enock.

Methods

Citations to the species recorded here are not given, except for one species newly recorded from India. Only body lengths are given in millimeters; all other measurements are relative, taken with the help of an ocular micrometer placed in the eye piece of a compound microscope. All the measurements were made at the same magnification for all the parts.

The following abbreviations are used in the text: F1, F2, F3 = Funicle segments 1, 2, 3; T1, T2 = Tergites 1, 2, of gaster; ZDAMU = Insect Collections, Department of Zoology, Aligarh Muslim University, Aligarh, India.

Description of new species

***Alaptus jowainus* sp. nov.**
(Figures 1–7)

Female. Holotype. Length, 0.38 mm (paratypes, 0.38–0.42 mm). Body brown to dark brown. Mandible dark brown. Antenna brown except pedicel and scape light brown. Fore wing hyaline, slightly infuscate at base below venation. Hind wing subhyaline; veins brown. Legs brown; tarsal segments light brown. Ovipositor light brown.

Head (Fig.1). Transverse striations on occipital area. Mandible unidentate. Scape longitudinally striated, 2.8× as long as broad; pedicel about 0.6× of scape (16:23) (paratypes, 14–18:25–27); funicle 5-segmented; F1–5 distinctly longer than broad, F5 about 2× as long as broad; clava subequal to F2–5 combined, F2 longest; clava 4.4× as long as broad with 3 longitudinal sensilla (Fig. 2).

Mesosoma (Fig. 5) 0.85× as long as metasoma; pronotum not visible in dorsal view; mid lobe of mesoscutum with transverse reticulations and with 1+1 setae; each side lobe with one seta; lateral part of scutellum with a few longitudinal striations; propodeum smooth with median length 0.26× of scutellum length (8:30). Fore wing (Fig. 3)13.3× (paratypes, 11.1– 12×) as long as broad with 5 discal setae (paratypes,5–8) beyond venation; marginal fringe about half of wing width; hind wing (Fig. 4) 20× (paratypes, 19.3–20.3×) as long as broad. Legs normal; fore femur shorter than hind femur; mid tibia with anterior seta.

Metasoma (Fig. 5) longer than mesosoma (68: 58) (paratypes, 68–80:58–65), about 1.17× of mesosoma length; ovipositor originates from end of T2 of gaster; total ovipositor length 0.8× as long

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as metasoma, exserted part of ovipositor 0.20× of gaster; ovipositor 1.14× as long as mid tibia. *Relative measurements* (holotype, slide)—head dorsal width, 60; eye height, 21; maximum diameter of torulus 5; distance between torulus and mouth margin, 10; distance between toruli, 14; antennal segments, length (width): scape, 23 (8); pedicel, 16 (8); F1, 9 (4); F2, 12 (4); F3, 9 (5); F4, 10 (5); F5, 10 (5); clava, 40 (9); mesosoma length (width), 58 (42); mesoscutum length (width), 21 (46); scutellum length (width), 30 (38); propodeum length, 8; fore wing length (width), 160 (12); marginal fringe length, 72; hind wing length (width), 140 (7); marginal fringe length, 60; fore tibia length, 33; fore basitarsus length, 10.5; mid femur length, 45; mid tibia length, 48; mid basitarsus length, 13; hind femur length, 65; hind tibia length, 45; metasoma length (width), 68 (65); ovipositor length, 55; exserted part ovipositor, 14.

Male. Length, 0.39 mm. Head with transverse striations, Antenna (Fig. 6) 10-segmented; scape 2.7× as long as broad; funicle segments longer than broad, F1 subequal to F3; F4–F7 equal in lengths, F8 longest. Fore wing (Fig. 7) 12.6× as long as broad with 8 discal setae in the middle.

Material examined. Holotype, female (on slide under 3 coverslips): INDIA: MEGHALAYA: Jowai, Thaldskin, 22.x.2008, Coll. F.R. Khan. (ZDAMU, registration No. HYM.CH.676)

Paratypes: 6 females, 1 male (on slides): INDIA: UTTARAKHAND: Ranikhet, Chaubatia, 5 females, 1 male, 27.x.2009, Coll. F.R. Khan; Dehradun, Udaibagh, 1female, 03.xi.2009, Coll. F.R. Khan. (ZDAMU, reg. No. HYM.CH.676).

Distribution. INDIA: Meghalaya, Uttarakhand.

Etymology. The species name is derived from the name of the district (Jowai) from where the holotype was collected.

Comments. This new species appears similar to *A. ramamurthyi* Anwar & Zeya (2013, this journal) by having pointed clava and 5 discal setae on fore wing, but differs as follows: head completely dark brown; antennal pedicel not robust; clava subequal to F2–F5 combined and markedly shorter than funicle; fore wing 13.3× as long as broad; ovipositor originates from T2 of gaster and slightly exserted at apex, the exserted part about 0.2× of gaster length; ovipositor 1.14× as long as mid tibia. (In *A. ramamurthyi:* head dark brown with area around mouth margin pale brown; antennal pedicel robust; clava slightly shorter than funicle; fore wing 10.3× as long as broad; ovipositor originates near base of gaster and strongly exserted at apex, the exserted part about one-third of gaster length; ovipositor 2.27× as long as mid tibia).

Genus *Camptoptera* Foerster

Camptoptera Foerster, 1856: 116, 119, 144. Type species *Camptoptera papaveris* Foerster, by monotypy.

Pteroclisis Foerster, 1856: 144. Unnecessary replacement name for *Camptoptera*.

Stichothrix Foerster 1856: 117,118,121. Type species *Stichothrix cardui* Foerster, by monotypy. Synonymy by Annecke & Doutt (1961).

Eomymar Perkins, 1912: 26. Type species *Eomymar muiri* Perkins, by monotypy. Synonymy by Huber & Lin (1999).

Congolia Ghesquière, 1942: 320. Type species *Congolia sycophila* Ghesquière, by original designation. Synonymy by Debauche (1949).

Sphegilla Debauche, 1948: 62. Type species *Sphegilla franciscae* Debauche, by original designation. Synonymy by Yoshimoto (1990).

Camptoptera (*Zemicamptoptera*) Ogloblin & Annecke, 1961: 24. Type species *Camptoptera* (*Zemicamptoptera*) *semialbata* Ogloblin & Annecke, by original designation.

Wertanekiella Soyka, 1961: 87. Type species *Wertanekiella brevicornis* Soyka, by original designation. Synonymy with *Sphegilla* by Mathot (1969).

Staneria Mathot, 1966: 214. Type species *Staneria diademata* Mathot, by original designation. Synonymy by Huber & Lin (1999).

Camptoptera Foerster: Annecke & Doutt, 1961: 15. Soyka, 1961: 73. Schauff, 1984: 39. Noyes & Valentine, 1989: 29. Yoshimoto, 1990: 32. Huber & Lin, 1999: 27.

Diagnosis

Female. Antenna with 9 or 10 segments, formula, 1161 or 1171; funicle with F2 usually ring-like. Mandible with one tooth. Each axilla with one long seta; mesophragma not extending into gaster; propodeum at least half as long as scutellum. Fore wing narrow near base, with posterior margin almost always concave, giving a distinctly curved apex; disc with 1–4 rows of setae; marginal vein short; venation not extending beyond basal third of wing. Tarsi with 5 segments.

Male. Flagellum 9-segmented with F2 and F4 ring-like in a 10-segmented flagellum, or all flagellar segments of normal length in a 9-segmented flagellum.

Hosts. Eggs of Scolytidae and Buprestidae, and possibly Cicadellidae, Aleyrodidae and Thripidae.
Species and distribution. Cosmopolitan; 76 species in world.

Nine species are known from India, including the new species described in this paper and the newly recorded species from India:

1. *Camptoptera ambrae* Viggiani, 1978
2. *Camptoptera brevifuniculata* Subba Rao, 1989
3. *Camptoptera dravida* Subba Rao, 1989
4. *Camptoptera kannada* Subba Rao, 1989
5. *Camptoptera longifuniculata* Viggiani, 1978
6. *Camptoptera matcheta* Subba Rao, 1989
7. *Camptoptera muiri* (Perkins, 1912)
8. *Camptoptera sakaii* Taguchi, 1977 (new record)
9. *Camptoptera assamensis* **sp. nov.**

Key to Indian species of *Camptoptera*, females

1. Funicle 7-segmented, with F2 ring-like 2
-. Funicle 7-segmented, with F2 not ring-like ..... ***C. muiri* (Perkins)**
2. Head with transversely elongate reticulate sculpture 3
-. Head with transversely striate reticulate sculpture 4
3. Mesoscutum with transversely reticulate sculpture; scutellum with polygonal cells, sides with longitudinal cells; fore wing with 3–4 rows of discal setae ..... ***C. matcheta* Subba Rao**
-. Mesoscutum with scale like reticulation; scutellum with reticulate sculpture; fore wing with one row of discal setae ..... ***C. assamensis* sp. nov.**
4. Mesoscutum with transversely striate reticulate sculpture 5
-. Mesoscutum with reticulate sculpture 6
5. Scutellum with elongated polygonal cells; scape long, well dilated; pedicel shorter than scape; all funicle segments, except the second, longer than broad ..... ***C. brevifuniculata* Subba Rao**
-. Scutellum with striate reticulate sculpture ..... ***C. dravida* Subba Rao**
6. Fore wing with discal setae arranged in two rows; an infuscate triangular patch near stigmal vein present ..... ***C. sakaii* Taguchi**
-. Fore wing with discal setae arranged in a median line 7
7. Scutellum with elongate polygonal cells; scape narrower than pedicel; petiole smooth ..... ***C. kannada* Subba Rao**
-. Scutellum with transversely reticulate sculpture; petiole lamellate 8
8. Antenna with scape not curved; F1 2× as long as pedicel ..... ***C. longifuniculata* Viggiani**
-. Antenna with curved scape; F1 as long as pedicel ..... ***C. ambrae* Viggiani**

***Camptoptera assamensis* sp. nov.**
(Figures 8–14)

Female. Holotype. Length,0.3 mm. Body dark brown; orbital trabeculae divided into 9 pieces. Antenna light brown except scape with proximal part dark brown; F6, F7 and clava dark brown. Fore wing and hind wing infuscate at base. Posterior part of gaster dark brown. Legs yellow; coxae light brown.

Head (Fig. 9). Occipital area with transverse reticulation, and with one pair of setae; transfrontal trabecula undivided; posterior ocelli close to transverse trabecula. Mandible unidentate. Antenna with scape and pedicel short with longitudinal striations; pedicel about 0.83× of F1 length; F1 longest; F4 and F5, F6 and F7 equal in length (Fig. 8); clava with 2 longitudinal sensilla.

Mesosoma (Fig. 12) longer than metasoma, about 1.22× as long as gaster; pronotum not visible in dorsal view of mesosoma; prosternum subpentagonal in shape and striated, with a depression at posterior part; notauli incomplete; axilla reticulated with 1+1setae; mesoscutum with scale-like reticulations except posterior part with longitudinal cells; scutellum reticulate, middle to posterior part with longitudinal cells as in Fig. 13; propodeum with 'H'shaped carinae. Fore wing (Fig. 10) 20.6× as long as broad; disc with 7 setae in a row. Hind wing (Fig.11) 30× as long as broad.

Metasoma. Petiole (Fig. 12) with lateral projections; ovipositor not exserted (Fig. 14) and about 0.3× metasoma length.

Relative measurements (Holotype, slide)—head dorsal width, 45; antennal segments length (width): scape,18 (4); pedicel, 10 (7); funicle length, 45; F1, 12 (2); F2, 1(2); F3, 11(2); F4, 9(2); F5, 9(2); F6, 10 (3); F7, 10 (4); clava, 25(9); mesosoma length (width), 55 (38); mesoscutum length, 13; scutellum length, 25; propodeum length 28; fore wing length (width), 124 (6); marginal fringe length, 44; hind wing length (width), 120 (4); marginal fringe length, 36; fore tibia length, 25; fore basitarsus length, 10; mid tibia length, 42; hind tibia length, 44; hind basitarsus length, 10; metasoma length (width), 45 (43); petiole length, 7; ovipositor length, 14.

Male. Unknown.

Material examined. Holotype, female (on slide): INDIA: ASSAM: Guwahati, Amingaon; 29.x.2008, Coll. F.R.Khan (ZDAMU, registration No. HYM.CH.677).

Distribution. India: Assam.

Etymology. The species name is derived from the State (Assam) from where the holotype was collected.

Comments. *C. assamensis* sp. nov. is similar to *C. philippina* Taguchi, but differs by having F6, F7 and clava dark brown, with two longitudinal sensillae; proximal part of scape dark brown; scutellum reticulate, middle to posterior part with longitudinal cells; prosternum striated; propodeum with 'H'shaped carinae without any setae. Fore wing 20.6× as long as broad. (In *C. philippina:* clava light brown with 4 longitudinal sensillae; pedicel and scape dusky brown; scutellum reticulated with three hexagonal cells ranged on each transverse line by which scutellum divided into two parts, the anterior part more densely cellulate than posterior part; prosternum reticulated; propodeum with 3 setae in the middle and bordered by a strong ridge; fore wing 12.9× as long as broad].

Records of species

***Camptoptera matcheta* Subba Rao**

Material examined. INDIA: UTTAR PRADESH: Lakhimpur, Lakhkhi Purwa, Boodapahar, 1female (on slide), 26.ix.2006, Coll. S.M.A. Badruddin & F.R. Khan. (ZDAMU)

***Camptoptera dravida* Subba Rao**

Material examined. INDIA: UTTAR PRADESH: Aligarh: Department of Zoology, 1female (on slide), 04.iv.2011, Coll. T. Rehmat; Sharawasti, Chakra Bhandar, 1female (on slide), 30.x.2006, Coll. F.R. Khan; Aligarh, Shekha, 2 females, 2 males (on slides), 09.ix.2007, F.R. Khan. UTTARA-KHAND: Ranikhet, Chaubatia, 3females (on slides), 27.x.2009, Coll. F.R. Khan. (ZDAMU)

***Camptoptera sakaii* Taguchi**
(Figures 15–20)

Camptoptera sakaii Taguchi, 1977: 143–146, female. Taiwan, Kenting Park.

As this species is newly recorded from India, it is redescribed based up on the Indian specimens.

Redescription

Female. Body dark brown. Antenna light brown, except scape and pedicel honey yellow. Fore wing infuscate at base, and with a triangular patch below stigmal vein. Hind wing infuscate. Legs yellowish brown.

Head (Fig.15). Occipital area with transverse reticulations. Antenna with scape and pedicel striated; clava with two longitudinal sensilla reaching apex; F1 subequal to pedicel; F3 longest (Fig. 16).

Mesosoma (Fig. 17). Pronotum not visible in dorsal view of thorax; mesoscutum shorter than scutellum and with transverse reticulations; notauli complete reaching towards posterior margin of mesoscutum; postscutellum laterally and posteriorly with elongated cells as in Fig. 18; propodeum with 7–10 tuberculi and 'W' shape carinae. Fore wing (Fig. 19) about 12.2× as long as broad with distal macrochaeta strong and with 9 tubercles on subcostal vein; two rows of setae on disc. Hind wing 30.6× as long as broad.

Metasoma (Fig.20) subequal to mesosoma; petiole with 'Y' shaped carina on dorsal surface; ovipositor not exserted, and 0.56× of mid tibia length.

Relative measurements (slide)—scape length (width), 25 (7); pedicel length (width),12 (9); funicle length, 135; F1length,12; F2 length, 1; F3 length,18; F4 length,15; F5 length,14; F6 length,13; F7 length,13; clava length, 42; mesosoma length, 75; mesoscutum length, 24; scutellum length (width), 33(45); fore wing length (width), 196 (16); marginal fringe length, 84; hind wing length (width), 184 (6); marginal fringe length, 48; fore tibia length, 40; fore basitarsus length,15; mid tibia length, 60; mid basitarsus length,15; hind tibia length, 60; hind basitarsus length, 20; metasoma length (width), 80 (65); petiole length,18; ovipositor length, 34.

Male. Unknown.

Material examined. INDIA: ASSAM: Kamrup, Boodapahar, 4 females (on slides), 30.x.2008, Coll. F.R. Khan. (ZDAMU)

Distribution. India (present record): Assam (Taiwan).

Comments. The specimens listed above agree fairly well with the original description and figures given for *C. sakaii* by Taguchi (1977). It differs from the other Indian species by the characters given in the key.

***Himopolynema hishimonous* Taguchi**

Material examined. INDIA: UTTAR PRADESH: Gonda: Porterganj, 1male (on slide), 07.x.2006, Coll. F.R. Khan. WEST BENGAL: Cooch Behar, Mati Khata, 1female, 1male (on slides), 25.v.2008, Coll. F.R. Khan; New Jalpaiguri, Chatt Purdanpura, 2 females (on slides), 30.v.2008, Coll. F.R. Khan; Islampur, Gudish Basti, 1female (on slide), 07.vi.2008, Coll. F.R. Khan; New Alipurduar, Marich Bari, 1female (on slide), 20.v.2008, Coll. F.R. Khan. (ZDAMU)

***Himopolynema haflongum* Hayat & Singh**

Material examined. INDIA: WEST BENGAL: Islampur, Sibdargi Para, 1female (on slide), 10.vi.2008, Coll. F.R. Khan. (ZDAMU)

***Himopolynema longiclavatum* Hayat & Anis**

Material examined. INDIA: WEST BENGAL: New Jalpaiguri, Chatt Purdanpura, 2 females (on slides), 30.v.2008, Coll. F.R. Khan. (ZDAMU)

***Stethynium empoascae* Subba Rao**

Material examined. INDIA: UTTAR PRADESH: Nagla Dawoodpur, 1female (on slide), 06.iv.2007, Coll. F.R. Khan; Tundla, Sikrari, 1female, 1male (on slides), 01.ix.2007, Coll. F.R. Khan. PUNJAB:

Pathankot, Sujanpur, 1female (on slide), 10.vii.2006, Coll. S.M.A. Badruddin & F.R. Khan. (ZDAMU)

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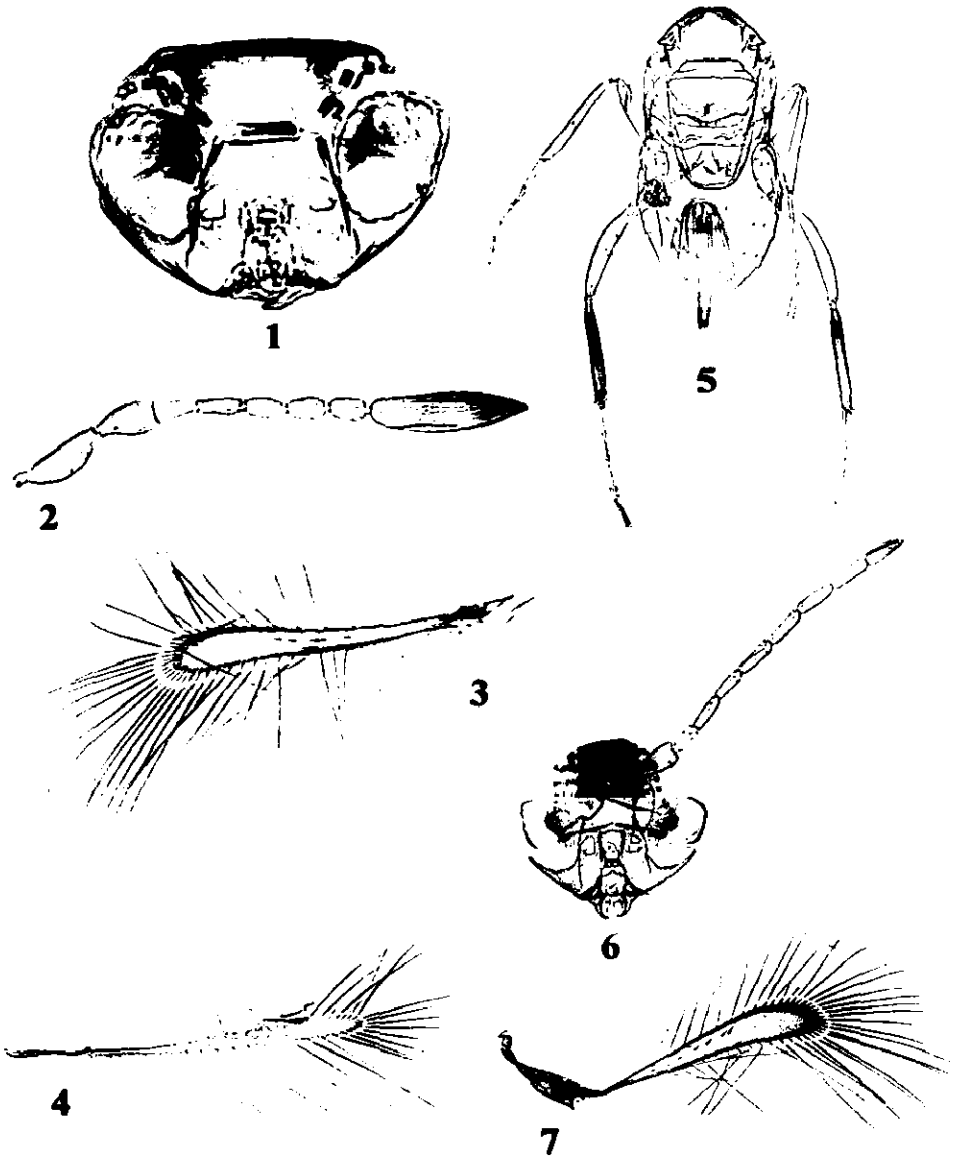
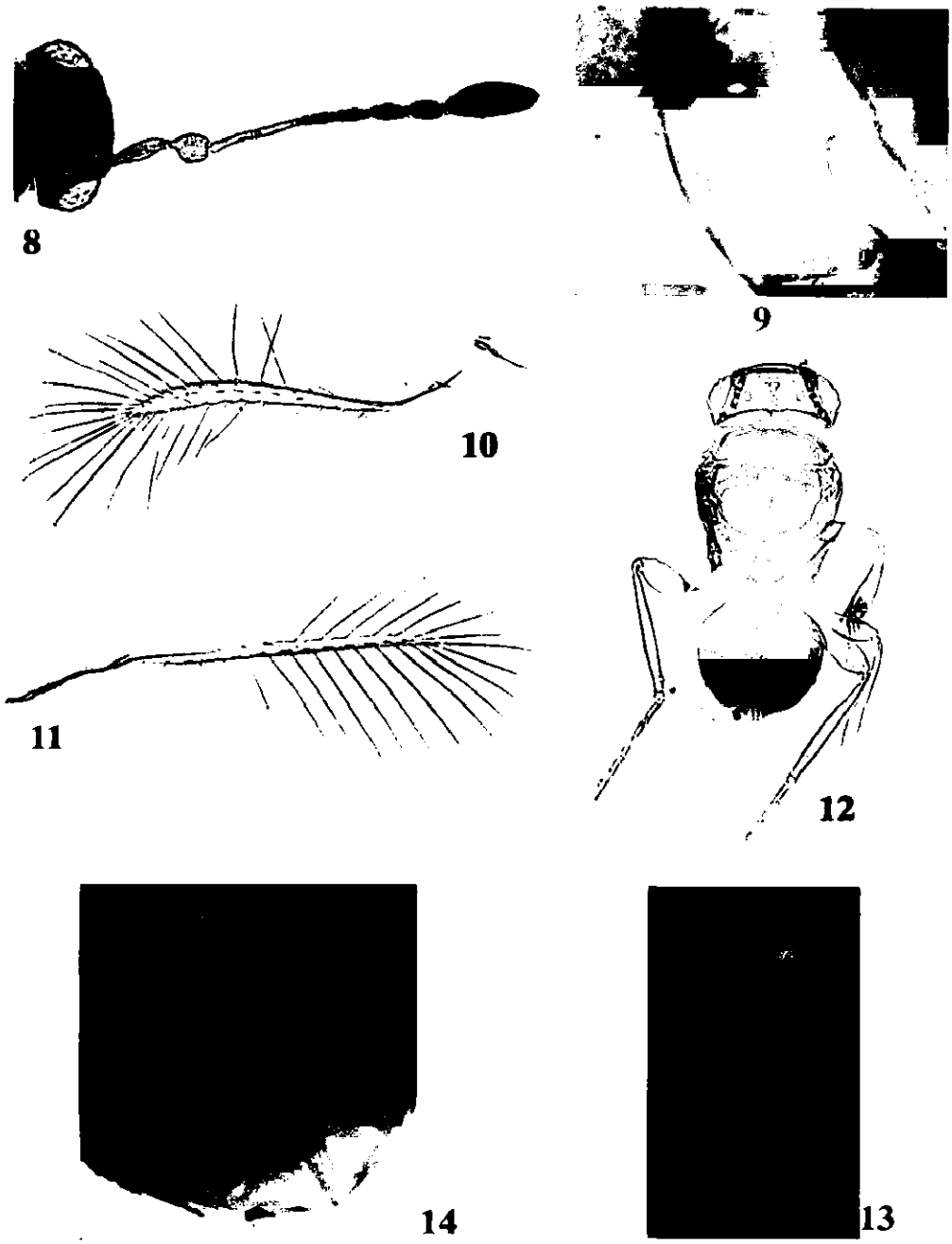
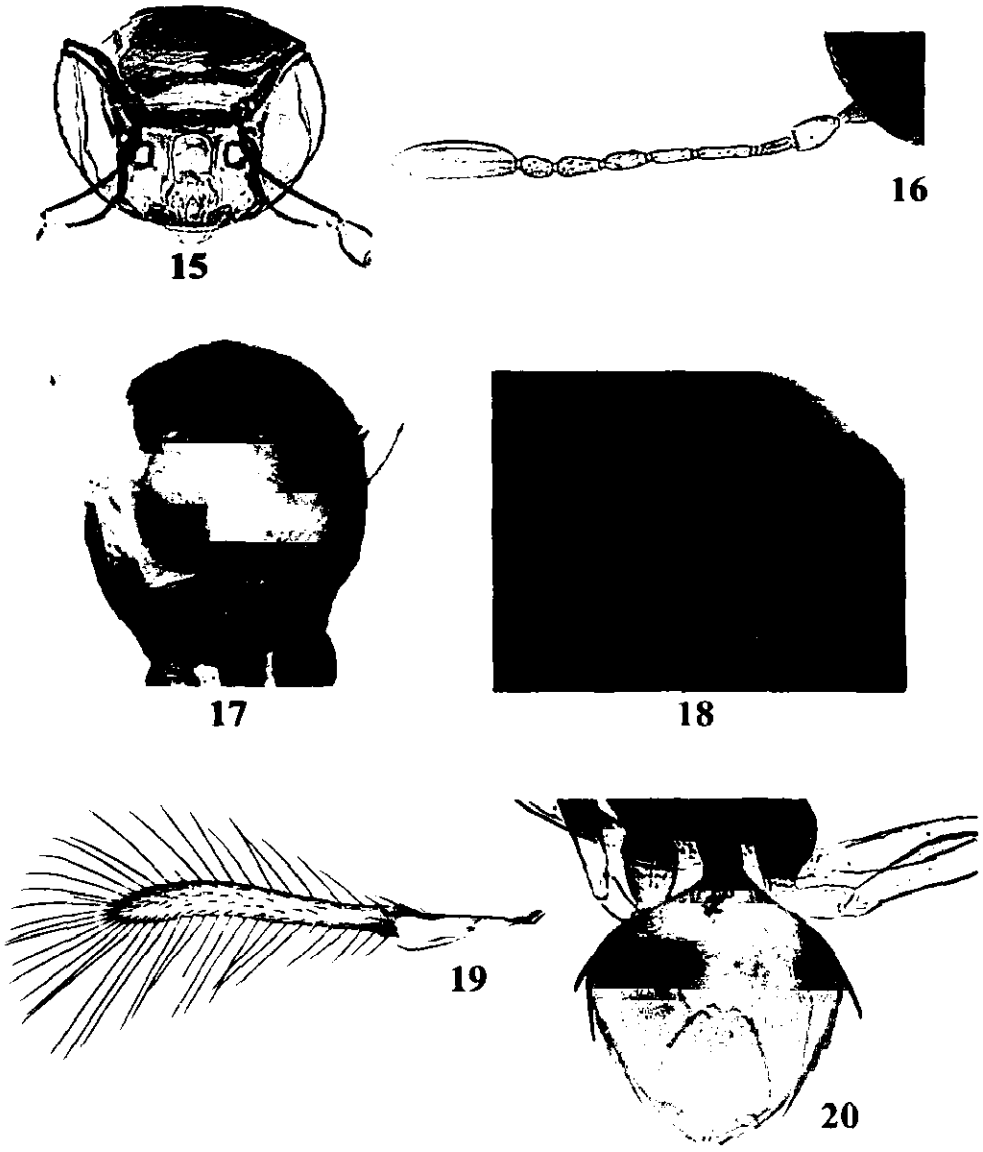


FIGURES 1–7. *Alaptus jowainus* **sp. nov.** holotype, female: 1, head frontal; 2, antenna; 3, fore wing; 4, hind wing; 5, body dorsal. Male: 6, head with antenna; 7, fore wing.



FIGURES 8–14. *Camptoptera assamensis* **sp. nov.**, holotype, female: 8, head with antenna; 9, head sculpture; 10, fore wing; 11, hind wing; 12, body, dorsal; 13, part of thorax showing sculpture; 14, gaster, showing ovipositor



FIGURES15–20. *Camptoptera sakaii* Taguchi, female: 15, head; 16, antenna; 17, mesosoma; 18, part of thorax showing sculpture; 19, fore wing; 20, metasoma, showing ovipositor.

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An updated Checklist of Fairyflies (Hymenoptera—Chalcidoidea—Mymaridae) occurring in India

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Abstract: A total of 27 Mymaridae genera are currently reported from India, which make 26.2% of the presently known world fauna. But, the number of Indian species (124) is incomplete, forming just 8.7% of world species diversity. There are 103 genera and 1,424 species of Mymaridae known worldwide (*vide* Noyes, 2012). Only a few Indian genera have so far been studied in some detail, like *Gonatocerus* Nees von Esenbeck, *Polynema* Haliday and *Acmopolynema* Ogloblin. The most species-rich genus in India is *Gonatocerus* (49 spp.), representing 39.5% of all Indian Mymaridae. A complete, updated checklist of Indian Mymaridae is presented here. This list is based on a detailed study of all available published data. The genus *Schizophragma* Ogloblin is newly recorded from India, based on species (undetermined) we have seen in collections.

Introduction

The micro-wasps of Mymaridae, commonly known as "fairyflies," are minute in size, ranging from 0.2-3.0mm in length, rarely larger. So far as their biology is known, mymarids are oophagous, parasitizing the eggs of other insects. They may be reared from eggs, or collected using sweep nets, or through setting up of suction, Malaise, pitfall and yellow pan traps. In spite of their abundance, mymarids still comprise of a relatively small number of currently recognized species (*cf* Huber, 1986), perhaps owing to their minute size and unreliable early publications (being incomplete, difficult to use) on their taxonomy and bio-ecology.

Members of the family Mymaridae probably comprise an abundant group and are found worldwide, in almost every habitat, throughout the year. The world fauna of Mymaridae is, currently, 103 genera with 1,424 species (Noyes, 2012). Some genera are highly speciose and peregrine in distribution; the genus *Gonatocerus* Nees von Esenbeck contains about 258 world species (18% of total); *Camptoptera* Förster has 76 species recorded from the Nearctic, Neotropical, Palaearctic, Afrotropical, Oriental and Australian regions; *Himopolynema* Taguchi has 11 species recorded from the Palaearctic, Australian and Oriental regions; *Alaptus* Haliday is known from about 60 world species in the Afrotropical, Australian, Nearctic, Palaearctic and Oriental regions; and *Stethynium* Enock has 53 species in the Nearctic, Neotropical, Palaearctic, Oriental and Australian regions. Though we have focused only on Indian Mymaridae, a few speciose genera have been compared with the World fauna to understand their comparative abundance.

The present study is based on earlier records of species from India, and those collected from several States and Union Territories during the last 18 years (1995-2013). A new record is introduced here (*vide infra*), based on unpublished data of specimens examined by us in collections. Subba Rao & Hayat (1986) was the last published checklist and they had listed 67 species in 19 genera; our present checklist includes 124 species (+ more undetermined) of 27 genera.

It will be seen from the present checklist that some genera contain many Indian species, *viz.*, *Gonatocerus* Nees von Esenbeck (49 species), *Polynema* Haliday (12 spp.), *Acmopolynema* Ogloblin (8 spp.), *Camptoptera* Förster (7 spp.), *Anagrus* Haliday (9 spp.), *Erythmelus* Enock (6 spp.), *Himopolynema* Taguchi (5 spp.), *Alaptus* Haliday and *Mymar* Curtis (3 spp. each). The remaining genera are represented only by one or two species each. We have also recorded the genus *Schizophragma* Ogloblin, 1949 for the first time in India, *i.e.*, from Uttar Pradesh, based on specimens we have examined in collections. This genus belongs to the *Anagrus*-group of genera and was earlier known from seven species in the Nearctic and Neotropical regions (Huber 1987). Our new record increases this to 8 known world species.

Material and methods

The following checklist is based on our taxonomic studies and data obtained from all available literature published up to 2013. It does not incorporate phylogeny. Data of only valid species described from India (see references) are given in the distributions cited, as much as feasible, and included only after critical assessment. Some undetermined (to species) material from several Indian States are also included in our checklist, based on our or others' taxonomic studies.

The present study is based only on females, though males are also present in our collected samples, since it is difficult to associate sexes correctly from swept material and these can only be identified when both sexes are reared together from known hosts. See Noyes (1982) for hints on collecting and preserving chalcidoid wasps.

Updated Checklist of Indian Mymaridae

All genera and species are arranged in alphabetical order below and the number of species in each genus is given in square brackets after the genus name. This is just a basic updated checklist of Subba Rao & Hayat (1986), with current taxonomic changes; more synonymy and further details can be obtained by reference to that paper and to Noyes (2012). The distribution of each species in India is given by States and Union Territories, and these are cited in alphabetical order.

Genus ***ACMOPOLYNEMA*** Ogloblin, 1946 [8 spp.]
(Type-sp.: *Stichothrix bifasciatipennis* Girault, by orig. design.; Subba Rao & Hayat, 1986: 179-180; Hayat & Anis, 1999b; Triapitsyn & Berezovskiy, 2007)

bimaculatum Subba Rao, 1989 [Kerala]
incognitum (Narayanan, Subba Rao & Kaur, 1960) [Delhi, Karnataka, Uttar Pradesh].
indochinense (Soyka, 1956) [Karnataka, Uttarakhand]
malabricum Subba Rao, 1989 [Kerala]
orientale (Narayanan, Subba Rao & Kaur, 1960) [= *maculata* Subba Rao, 1989, *nixoni* Subba Rao, 1989; Delhi, Himachal Pradesh, Karnataka, Kerala, Pondicherry[1], Tamil Nadu, Uttar Pradesh, West Bengal]
problema Triapitsyn & Berezovskiy, 2007 [Karnataka]
shrawastianum Hayat & Anis, 2008 [Uttar Pradesh]
tachikawai Taguchi, 1971 [Karnataka]

Genus ***ALAPTUS*** Westwood, 1839 [3 spp.]
(Type-sp.: *Alaptus minimus* Westwood, by monotypy; Subba Rao & Hayat, 1986: 180)

delhiensis Mani, 1942 [Delhi]
magnanimus Annandale, 1909 [West Bengal]
ramakrishnai Mani, 1942 [Tamil Nadu]

NOTE: At least one undetermined species seen from Meghalaya (Anis & Rehmat, unpubl.); others recorded from Pondicherry (Rameshkumar *et al.*, 2011b).

Genus ***ANAGROIDEA*** Girault, 1915 [1 sp.]
(Type-sp.: *Eustochus dubius* Girault, by orig. design. and monotypy; Subba Rao & Hayat, 1986: 180)

himalayana (Mani & Saraswat, 1973) [Himachal Pradesh, West Bengal]

Genus ***ANAGRUS*** Haliday, 1833 [9 spp.]
(Type-sp.: *Ichneumon atomus* Linnaeus, by subs. design. of Westwood, 1839; Subba Rao & Hayat, 1986: 180-181)

armatus (Ashmead, 1887) [Andhra Pradesh]
columbi Perkins, 1905 [Andhra Pradesh]

[1] Pondicherry has been 'officially' renamed Puducherry as pronounced in local vernacular; I retain the anglicized Pondicherry below for continuity and longstanding usage in scientific works – EDITOR.

dalhousieanus Mani & Saraswat, 1973 [Himachal Pradesh]
elegans Chiappini, 2002 [Orissa]
empoascae Dozier, 1932 [Delhi]
flaveolus Waterhouse, 1913 [Andhra Pradesh, Orissa]
flaviapex Chiappini & Lin, 1998 [Delhi, Tamil Nadu]
optabilis (Perkins, 1905) [Andhra Pradesh, Orissa, Tamil Nadu]
perforator (Perkins, 1905) [Orissa]

NOTE: Several undetermined species examined from Assam, Himachal Pradesh, Karnataka, Meghalaya, Uttar Pradesh, and West Bengal (Anis & Rehmat, unpubl.); others recorded from Kerala and Pondicherry (Rameshkumar *et al.*, 2011a,b).

Genus ***ANAPHES*** Haliday, 1833 [several undet. spp.]
(Type-sp.: *Ichneumon punctum* Shaw, by subs. design. of ICZN, Opinion 729, 1965; Subba Rao & Hayat, 1986: 182)
[= *Flabrinus* Rondani, 1877; *Austranaphes* Ogloblin, 1962]

NOTE: Several undetermined species examined from Assam, Himachal Pradesh, Karnataka, Kerala, Meghalaya, Pondicherry, Tamil Nadu, Uttar Pradesh, and West Bengal (Subba Rao & Hayat, 1986; Rameshkumar *et al.*, 2011a,b; Anis & Rehmat, unpubl.).

Genus ***ARESCON*** Walker, 1846 [2 spp.]
(Type-sp.: *Mymar dimidiatus* Curtis, by monotypy; Subba Rao & Hayat, 1986: 182-183)

enocki (Subba Rao & Kaur, 1959) [Bihar, Delhi, Gujarat, Himachal Pradesh, Karnataka, Maharashtra]
mudigerensis Subba Rao, 1989 [Karnataka, Kerala].
NOTE: Some undetermined species also noted from Kerala and Pondicherry (Rameshkumar *et al.*, 2011a,b)

Genus ***AUSTRALOMYMAR*** Girault, 1929 [1 sp.]
(Type-sp.: *Australomymar aurigerum* Girault, by monotypy)
[= *Nesetaerus* Doutt, 1955].

formosum Narendran & Hayat, *in* Narendran *et al.*, 2003 [Karnataka]

Genus ***CAMPTOPTERA*** Förster, 1856 [7 spp.]
(Type-sp.: *Camptoptera papaveris* Förster, by monotypy; Subba Rao & Hayat, 1986: 183-184; Soyka, 1961; Huber & Lin, 1999)
[= *Eomymar* Perkins, 1912; *Sphegilla* Debauche, 1948; *Wertanekiella* Soyka, 1961; *Zemicamptoptera* Ogloblin & Annecke, 1961 (as subgenus of *Camptoptera*); *Staneria* Mathot, 1966]

ambrae Viggiani, 1978a [Tamil Nadu]
brevifuniculata Subba Rao, 1989 [Tamil Nadu]
dravida Subba Rao, 1989 [Karnataka, Tamil Nadu, Uttar Pradesh]
kannada Subba Rao, 1989 [Karnataka]
longifuniculata Viggiani, 1978a [Tamil Nadu]
matcheta Subba Rao, 1989 [Karnataka, Uttarakhand, Uttar Pradesh]
muiri Perkins, 1912 [Tamil Nadu]

NOTE: At least three undetermined species examined from Assam (Anis & Rehmat, unpubl.).

Genus ***DICOPOMORPHA*** Ogloblin, 1955 [1 sp.]
(Type-sp.: *Dicopomorpha macrocephala* Ogloblin, by monotypy)
[= *Chromodicopus* Ogloblin, 1955; *Dicopulus* Ogloblin, 1955]

indica (Subba Rao, 1989) [Karnataka]

Genus ***DICOPUS*** Enock, 1909 [1 sp.]
(Type-sp.: *Dicopus minutissima* Enock, by monotypy)

noyesi Manikavasagam & Rameshkumar, *in* Manikavasagam *et al.*, 2011 [Andhra Pradesh, Tamil Nadu]

Genus ***EOFOERSTERIA*** Mathot, 1966 [1 sp.]
(Type-sp.: *Eofoersteria camptopteroides* Mathot, by orig. design. and monotypy; Subba Rao & Hayat, 1986: 184)

secunda Viggiani, 1978b [Tamil Nadu]

Genus ***ERYTHMELUS*** Enock, 1909 [6 spp.]
(Type-sp.: *Erythmelus goochi* Enock, by monotypy; Subba Rao & Hayat, 1986: 184)
[= *Enaesius* Enock, 1909; *Parallelaptera* Enock, 1909; *Anthemiella* Girault, 1912; *Erythmellelus* Viggiani & Jesu, 1985]

flavovarius (Walker, 1846) [= *empoascae* Subba Rao, 1966; Delhi, Pondicherry, Uttarakhand, Uttar Pradesh]
helopeltidis Gahan, 1949 [Andhra Pradesh, Uttar Pradesh]
lygivorus Viggiani & Jesu, 1985 [Kerala, Uttar Pradesh]
nuinu Triapitsyn & Berezovskiy, 2007 [Kerala, Pondicherry, Tamil Nadu]
panis (Enock, 1909) [Tamil Nadu] [= *Erythmelus panchama*, Subba Rao, 1989]
teleonemiae (Subba Rao, 1984) [= *Parallelaptera polyphaga* Livingstone & Yacob, 1988; Karnataka, Tamil Nadu]

Genus ***EUBRONCUS*** Yoshimoto, Kozlov & Trjapitzin, 1972 [1 sp.]
(Type-sp.: *Eubroncus orientalis* Yoshimoto, Kozlov & Trjapitzin, by orig. design. and monotypy)

indicus Hayat & F.R. Khan, 2009 [West Bengal]

Genus ***GONATOCERUS*** Nees von Esenbeck, 1834 [49 spp.]
(Type-sp.: *Gonatocerus longicornis* Nees, by monotypy; Subba Rao & Hayat, 1986: 184-187; Zeya & Hayat, 1995; Zeya & F.R. Khan, 2102)

[*Asulcifrons* species-group : 7 spp.]

asculifrons Zeya, in Zeya & Hayat, 1995 [Assam]
devikulamus Mani & Saraswat, 1973 [Tamil Nadu]
garyi Manickavasagam & Rameshkumar, 2013 [Karnataka]
gunathilagaraji Manickavasagam & Rameshkumar, 2013 [Karnataka]
heratyi Manickavasagam & Rameshkumar, 2013 [Karnataka]
sergueii Manickavasagam & Rameshkumar, 2013 [Karnataka]
similis Gupta & Poorani, 2008 [Karnataka]

[*Ater* species-group : 12 spp.]

ater Förster, 1841 [Andhra Pradesh, Assam, Bihar, Delhi, Kerala, Punjab, Orissa, Sikkim, Uttarakhand, Uttar Pradesh, West Bengal]
bialbifuniculatus Subba Rao, 1989 [Tamil Nadu]
fulvipodus Subba Rao, 1989 [Kerala]
hayati Zeya & F.R. Khan, 2012 [West Bengal]
kashipurensis Zeya & F.R. Khan, 2012 [Uttarakhand]
kodaianus (Mani & Saraswat, 1973) [Tamil Nadu, Himachal Pradesh]
longiterebratus Subba Rao, 1989 [Kerala]
monticolus Zeya, *in* Zeya & Hayat, 1995 [Himachal Pradesh, Sikkim, Uttarakhand]
sahadevani (Subba Rao & Kaur, 1959) [Delhi, Jharkhand, Kerala, Punjab, Uttarakhand, Uttar Pradesh, West Bengal]
trialbifuniculatus Subba Rao, 1989 [Karnataka, Uttarakhand, West Bengal]
udakamundus Mani & Saraswat, 1973 [Tamil Nadu]
unicolouratus Subba Rao, 1989 [Delhi]

[*Litoralis* species-group : 22 spp.]

bakrotus Mani & Saraswat, 1973 [Himachal Pradesh, Kerala]
bashai Zeya, *in* Zeya & Hayat, 1995 [Assam, Kerala, Pondicherry]
berijamus Mani & Saraswat, 1973 [Kerala, Tamil Nadu]
bicoloriventris Zeya, *in* Zeya & Hayat, 1995 [Bihar, Karnataka, Uttar Pradesh, West Bengal]

bouceki Zeya, *in* Zeya & Hayat, 1995 [Bihar, Kerala, Pondicherry, Uttar Pradesh]
brevifuniculatus Subba Rao, 1970 [Maharashtra, Punjab, Rajasthan, Tamil Nadu]
breviterebratus Subba Rao, 1989 [Karnataka, Uttar Pradesh]
coimbatorensis Zeya, Manickavasagam & Rameshkumar, 2012 [Tamil Nadu]
delhiensis (Narayanan & Subba Rao, 1961) [= *Gonatocerus relictus* Mani & Saraswat, 1973; *Gonatocerus alami* Shamim & Shafee, 1984; *Gonatocerus noyesi* Subba Rao, 1989; *Gonatocerus virgatus* Subba Rao, 1989; Andhra Pradesh, Bihar, Delhi, Himachal Pradesh, Karnataka, Kerala, Orissa, Pondicherry, Punjab, Tamil Nadu, Uttar Pradesh]
devitatakus Mani & Saraswat, 1973 [Tamil Nadu]
longicrus Kieffer, 1913a [Orissa; *incertae sedis, vide* Zeya & Hayat, 1995]
longior Soyka, 1946 [Uttar Pradesh]
maculatus Zeya, *in* Zeya & Hayat, 1995 [Uttar Pradesh]
malanadensis Subba Rao, 1989 [Karnataka]
munnarus Mani & Saraswat, 1973 [Andhra Pradesh, Jammu & Kashmir, Jharkhand, Kerala, Madhya Pradesh, Maharashtra, Orissa, Tamil Nadu, Uttar Pradesh, West Bengal]
narayani (Subba Rao & Kaur, 1959) [Andhra Pradesh, Assam, Bihar, Delhi, Himachal Pradesh, Kerala, Orissa, Pondicherry, Tamil Nadu, Uttarakhand, Uttar Pradesh, West Bengal]
pahlgamensis (Narayanan, 1961) [= *Gonatocerus kanheriensis* Mani & Saraswat, 1973; *Gonatocerus aligarhensis* Shamim & Shafee, 1984); Andhra Pradesh, Assam, Bihar, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Kerala, Maharashtra, Orissa, Pondicherry, Punjab, Tamil Nadu, Uttarakhand, Uttar Pradesh, West Bengal]
ramakrishnai (Subba Rao & Kaur, 1959) [Delhi]
spectabilis Zeya, *in* Zeya & Hayat, 1995 [Uttar Pradesh]
tamilanus Mani & Saraswat, 1973 [Kerala, Tamil Nadu, Orissa, Pondicherry, Uttar Pradesh, West Bengal]
triapitsyni Zeya, Manickavasagam & Rameshkumar, 2012 [Uttar Pradesh]
venustus Zeya, *in* Zeya & Hayat, 1995 [Bihar, Jharkhand, Kerala, Meghalaya, Orissa, Tamil Nadu, Uttar Pradesh, West Bengal].

[*Sulphuripes* species-group : 8 spp.]

edentulus Zeya, *in* Zeya & Hayat, 1955 [Jharkhand]
huberi Zeya, *in* Zeya & Hayat, 1995 [Kerala]
longicornis Nees von Esenbeck, 1834 [Assam, Chhattisgarh, Delhi, Jammu & Kashmir, Jharkhand, Kerala, Madhya Pradesh, Orissa, Tamil Nadu, Uttarakhand, Uttar Pradesh, West Bengal]
meghalayanus Zeya, 2011 [*nom. nov.* for *orientalis* Zeya, *in* Zeya & Hayat, 1995, preoccupied ; Andhra Pradesh, Meghalaya, Pondicherry, Tamil Nadu]
shamimi Subba Rao & Hayat, 1986 [Bihar, Jharkhand, Kerala, Orissa, Uttar Pradesh, West Bengal]
sulphuripes (Förster, 1847) [Himachal Pradesh]
tarae (Narayanan & Subba Rao, 1961) [Andhra Pradesh, Assam, Bihar, Delhi, Jammu & Kashmir, Jharkhand, Karnataka, Kerala, Maharashtra, Meghalaya, Orissa, Pondicherry, Tamil Nadu, Uttarakhand, Uttar Pradesh]
utkalensis Subba Rao, 1989 [Assam, Orissa]

NOTE: Several undetermined species from Assam, Himachal Pradesh, Karnataka, Meghalaya, Punjab, Uttarakhand, Uttar Pradesh, and West Bengal (Anis & Rehmat, unpubl.)

Genus ***HIMOPOLYNEMA*** Taguchi, 1977a [5 spp.]
(Type-sp.: *Himopolynema hishimonus* Taguchi, orig. design.)

haflongum Hayat & Singh, 2001 [Assam, West Bengal]
hexatricha Hayat & Basha, *in* Hayat *et al.*, 2003 [Assam]
hishimonus Taguchi, 1977a [Andhra Pradesh, Assam, Bihar, Uttar Pradesh, West Bengal]
indicum Hayat & Basha, *in* Hayat *et al.*, 2003 [Assam]
longiclavatum Hayat & Anis, 1999a [Karnataka, Kerala, West Bengal]

Genus ***LITUS*** Haliday, 1833 [2 spp.]
(Type-sp.: *Litus cynipseus* Haliday, by monotypy; Subba Rao & Hayat, 1986: 187; Triapitsyn & Berezovskiy, 2004; Rehmat *et al.*, 2009)

huberi Rehmat & Anis, *in* Rehmat *et al.*, 2009 [Assam]
triapitsyni Rehmat & Hayat, *in* Rehmat *et al.*, 2009 [Assam]
NOTE: At least one undetermined species from Assam (Anis & Rehmat, unpubl.), and one from Kerala (Rameshkumar *et al.*, 2011a)

Genus ***MYMAR*** Curtis, 1829 [3 spp.]
(Type-sp.: *Mymar pulchellus* Curtis, by subs. design. of ICZN, Opinion 729, 1965; Subba Rao & Hayat, 1986: 187-188)

roopum Hayat & F.R. Khan, in Hayat *et al.*, 2008 [Uttar Pradesh]
schwanni Girault, 1912 [Kerala, Orissa, Tamil Nadu, Uttarakhand, Uttar Pradesh,]
taprobanicum Ward, 1875 [= *Mymar indica* Mani, 1942; Delhi, Himachal Pradesh, Kerala, Madhya Pradesh, Orissa, Pondicherry, Rajasthan, Tamil Nadu, Uttarakhand, Uttar Pradesh]

Genus ***NARAYANELLA*** Subba Rao, 1976 [1 sp.]
(Type-sp.: *Narayana pilipes* Subba Rao, orig. design.; Subba Rao & Hayat, 1986: 188)

thornypoda (Narayanan & Subba Rao, 1961) [= *Anagrus khandalus* Mani & Saraswat, 1973; *Narayanella nigriclavata* Husain & Agarwal, 1981; Bihar, Karnataka, Kerala, Maharashtra, Tamil Nadu, Uttar Pradesh, West Bengal]

Genus ***OMYOMYMAR*** Schauff, 1983 [1 sp.]
(Type-sp.: *Paranaphoidea silvana* Ogloblin, orig. design.)

silvanum (Ogloblin, 1935) [Andhra Pradesh, Tamil Nadu]

Genus ***OOCTONUS*** Haliday, 1833 [2 spp.]
(Type-sp.: *Ooctonus insignis* Haliday, by subs. design. of Westwood, 1839; Subba Rao & Hayat, 1986: 188)

himalayus Subba Rao, 1989 [Himachal Pradesh].
nigrotestaceus Subba Rao, 1989 [Tamil Nadu]

Genus ***PALAEONEURA*** Waterhouse, 1915 [4 spp.]
(Type-sp.: *Palaeoneura interrupta* Waterhouse, by subs. design. of Gahan & Fagan, 1923)
[= *Chaetomymar* Ogloblin, 1946; *Acanthomymar* Subba Rao, 1970]

bagicha (Narayanan, Subba Rao & Kaur, 1960) [= *Mymarilla deccana* Mani & Saraswat, 1973; Delhi, Himachal Pradesh, Maharashtra, Punjab, Tamil Nadu, Uttar Pradesh]
indopeninsularis (Mani & Saraswat, 1973) [Tamil Nadu]
sophoniae Huber, 2003 [Uttar Pradesh]
unimaculatum (Hayat & Anis, 1999b) [Jammu & Kashmir, Karnataka, Kerala]

NOTE: One other, undetermined, species from Assam (Anis & Rehmat, unpubl.) and others from Kerala (Rameshkumar *et al.*, 2011a).

Genus ***POLYNEMA*** Haliday, 1833 [12 sp.]
(Type-sp.: *Polynema flavipes* Walker, by subs. design. of Huber & Bouček, 2001; Subba Rao & Hayat, 1986: 189-190; Hayat & Anis, 1999c)
[= *Notopolynema* Ogloblin, 1960; *Tarphypolynema* Ogloblin, 1960; *Restisoma* Yoshimoto, 1990; *Formicomymar* Yoshimoto, 1990; *Dorypolynema* Hayat & Anis, 1999c (as subgenus of *Polynema*)]

Subgenus ***Polynema*** Haliday, 1833, *s. str.* [11 spp.]

anamalaiense Mani & Saraswat, 1973 [Tamil Nadu]
anantanagana Narayanan, 1961 [Jammu & Kashmir]
assamense Hayat & Singh, 2001 [Assam]
brevicarinae Annecke & Doutt, 1961 [= *Polynema* (*Polynema*) *indica* Narayanan & Subba Rao, 1961; *P.* (*P.*) *truncata* Narayanan & Subba Rao, 1961; Bihar, Delhi, Karnataka, Kerala, Maharashtra, Orissa, Pondicherry, Tamil Nadu, Uttarakhand, Uttar Pradesh]
crassa Mani & Saraswat, 1973 [Himachal Pradesh]
dhenkunde Mani & Saraswat, 1973 [Himachal Pradesh].
dunense Hayat & Anis, 1999c [Uttarakhand].
huberi Manickavasagam & Rameshkumar, 2012 [Tamil Nadu]
kalatopense Mani & Saraswat, 1973 [Himachal Pradesh].
kamathi Mani & Saraswat, 1973 [Himachal Pradesh].
manaliense Hayat & Anis, 1999c [Himachal Pradesh]

Subgenus ***Dorypolynema*** Hayat & Anis, 1999c [1 sp.]
(Type-sp.: *Polynema mendeli* Girault, by orig. design. and monotypy)
mendeli Girault, 1913 [= *oophaga* Subba Rao, 1970; *narendrani* Subba Rao, 1989; Assam, Jharkhand, Kerala, Orissa, Pondicherry, West Bengal].

NOTE: Several undetermined species of *Polynema* from Assam, Himachal Pradesh, Punjab, Uttar Pradesh, and West Bengal (Anis & Rehmat, unpubl.).

Genus ***PSEUDANAPHES*** Noyes & Valentine, 1989 [1 sp.]
(Type-sp.: *Pseudanaphes hirtus* Noyes & Valentine, by orig. design. and monotypy; Rehmat & Anis, 2011)

sikkimianus Rehmat & Anis, 2011 [Sikkim]

Genus ***PTILOMYMAR*** Annecke & Doutt, 1961 [1 sp.]
(Type-sp.: *Ptilomymar rete* Annecke & Doutt, by orig. design. and monotypy; Subba Rao & Hayat, 1986: 190)

dictyon Hayat & Anis, 1999a [Kerala, Tamil Nadu]

Genus ***SCHIZOPHRAGMA*** Ogloblin, 1949 [undet. sp.]
(Type-sp.: *Schizophragma basalis* Ogloblin, original designation; Ref.: Huber, 1987)

NOTE: At least one undetermined species from Uttar Pradesh (Anis & Rehmat, unpubl.)

Genus ***STEPHANODES*** Enock, 1909 [1 sp.]
(Type-sp.: *Stephanodes elegans* Enock, by monotypy; Subba Rao & Hayat, 1986: 190-191)
[= *Eustephanodes* Ogloblin, 1967; *Masonana* Yoshimoto, 1990]

reduvioli (Perkins, 1905) [= *Stephanodes orientalis* Taguchi, 1978; *Polynema ahlaensis* Mani & Saraswat, 1973; Bihar, Delhi, Himachal Pradesh, Karnataka, Kerala, Tamil Nadu, Uttarakhand, Uttar Pradesh].

Genus *STETHYNIUM* Enock, 1909 [1 sp.]
(Type-sp.: *Stethynium triclavatum* Enock, by monotypy; Subba Rao & Hayat, 1986: 191)

empoascae Subba Rao, 1966 [Delhi, Karnataka, Uttar Pradesh].

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First record of *Pseudanaphes* (Hymenoptera:Mymaridae) from India, with description of a new species

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ABSTRACT. The mymarid genus *Pseudanaphes* Noyes & Valentine is recorded for the first time from India, and a new species, *P. sikkimianus* Rehmat & Anis, sp. nov., is described based on a specimen collected in Sikkim State, India.

KEYWORDS. Hymenoptera, Mymaridae, *Pseudanaphes*, new record, India.

Introduction

Four described species of *Pseudanaphes* Noyes & Valentine (Hymenoptera: Mymaridae) are known: *P. hirtus* Noyes & Valentine from New Zealand (Noyes and Valentine 1987), *P. zhaoi* Lin from China (Lin 1997), and *P. lincolni* (Girault, 1913) and *P. particoxae* (Girault, 1938) from Australia (Lin *et al.* 2007). The genus is also known from undescribed specimens from Nepal (Noyes and Valentine 1989). A single female, collected recently in Sikkim represents a new species and is the first record of *Pseudanaphes* from India. It is described below.

Methods: The single specimen was dissected and mounted in Canada balsam on a slide. Digital images were taken with a Nikon E8400 Digital camera. Relative measurements of various body parts were taken with the help of an ocular micrometer having a linear scale of 100 divisions, placed in the eye piece of a compound microscope. All the measurements were made on the same magnification for all the parts.

Abbreviation used: F = funicle segment.

Genus *Pseudanaphes* Noyes & Valentine

Pseudanaphes Noyes & Valentine, 1989: 47-48. Type species *Pseudanaphes hirtus* Noyes & Valentine, by original designation.

Other references. Lin, 1997 : 98, diagnosis, Chinese species; Lin *et al.* 2007 : 47, diagnosis, Australian species.

Diagnosis. ***Female.*** Antenna (Fig. 4) with radicle short, but distinct; funicle 6-segmented, clava 3-segmented, the sutures between the segments transverse. Mandible (Fig. 2) with 3 sharp teeth. Tarsi (Fig. 7) 4-segmented. Metasoma with petiole short, ring-like. Forewing (Fig. 5) shape characteristic, with evenly oval apex and posterior margin behind venation without a distinct lobe; disc usually with a dark, fairly well defined mark behind marginal vein, extending as a curved streak posteriorly and distally (Fig. 5), densely setose; venation fairly long but not extending half length of

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wing. Ovipositor at most as long as gaster (Fig. 8), not exserted.

Male. Illustrated and keyed by Lin *et al.* (2007), from a undetermined specimen. Almost similar to female except for antenna and genitalia. Antenna with flagellum 11-segmented with a 2-segmented clava.

Hosts. No host has yet been recorded for any species of *Pseudanaphes*, including the new one described here.

Pseudanaphes sikkimianus
Rehmat & Anis, sp. nov.
(Figs 1–8)

Type material. HOLOTYPE Female (on slide under 3 coverslips), labelled: "INDIA: Sikkim Gangtok Hanumantok 15.x.2008 Coll: F.R.Khan", "HOLOTYPE, [female symbol] *Pseudanaphes sikkimianus* sp. nov. Rehmat & Anis". Holotype deposited in the Insect Collection, Department of Zoology, Aligarh Muslim University, Aligarh, ("HYM. CH. 622" on a white ticket).

Description. Female. Body (From slide mounted specimen) dark brown except anterior scutellum brownish-yellow. Mandibles and antenna with radicle, scape, pedicel and funicle brownish-yellow, dorsal margins of scape and pedicel brown; clava dark brown (Fig. 4). Fore wing hyaline with the usual curved infuscate band behind proximal half of marginal vein, and infuscate behind submarginal vein (Fig. 5). Hind wing with faint infuscation. Legs brownish-yellow; fore tibia and tarsal segments 1–4 of mid and hind legs and 1–3 of fore leg yellow; tarsal segments 4 of fore leg pale brown.

Head (Fig. 1). Vertex with 6+6 long, brown setae; frons and face below transverse trabecula with 12 +12 long, brown setae; eyes sparsely setose, setae transparent and each seta about as long as diameter of a facet; ocellar triangle with apical angle strongly obtuse; posterior ocellus very close to eye margin, distance between posterior ocellus and eye margin 4. Antenna (Fig. 4) with F6 bearing one longitudinal sensillum; first segment of clava without sensilla, second segment of clava with 2 sensilla and third segment of clava with 3 sensilla; length and width of segments as follows: scape, 41:16; pedicel, 25:13; F1, 14.5:7; F2, 17:7; F3, 16:7; F4, 14.5:8.5; F5, 14.5:8.7, F6, 16.5:11; clava, 81:20.5.

Mesosoma. (Fig.3). Pronotum in middle fifth membranous, and lateral plate with 3 long and 2 short setae along collar; mid lobe of mesoscutum with 1+1 setae, each side lobe with one and each axilla with one seta; scutellum without setae; propodeum with a propodeal setae in about mesal fourth; medial length of propodeum 0.62x scutellum length (31:50). Fore wing (Fig. 5) 3.33x as long as broad (103.5:31), with marginal fringe 0.48x of wing width. Hind wing 15.4x as long as broad (77:5), with marginal fringe 2.4x as long as wing width; disc beyond venation with about 3 lines of setae between the usual line along anterior and posterior margins. Fore leg (Fig. 7) with protibia bearing 8 peg-like setae. Relative lengths of tibiae and tarsi as follows: fore leg 20:20.5; mid leg 29:20; hind leg 34:21.

Metasoma. (Fig.8). About as long as mesosoma; ovipositor originating from about level of second gastral tergite,and not exserted at apex; ovipositor length (34) equal to length of metatibia (34), and longer than mesotibia (34:29).

Male. Unknown.

Etymology. The species name is derived from the name of the Indian State (Sikkim) in which the holotype was collected.

Discussion. *Pseudanaphes sikkimianus*, sp. nov. is similar to *P. zhaoi* Lin (1997), but differs as follows (based on the description and figures given by Lin): distance between posterior ocellus and eye margin small (in *zhaoi*, distance between posterior ocellus and eye margin relatively large (4:7)); F5 subequal in length to

Fig. 1 Head frontal

Fig. 2 Mandibles

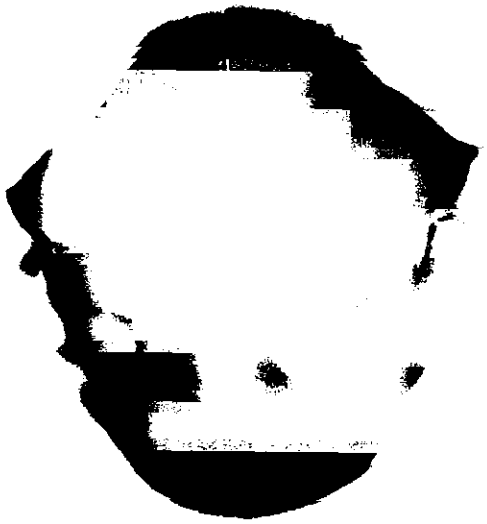

Fig. 3 Mesosoma dorsal

Fig. 4 Antenna

Fig. 5 Fore wing

Fig. 6 Hind wing

Fig. 7 Tarsal segments

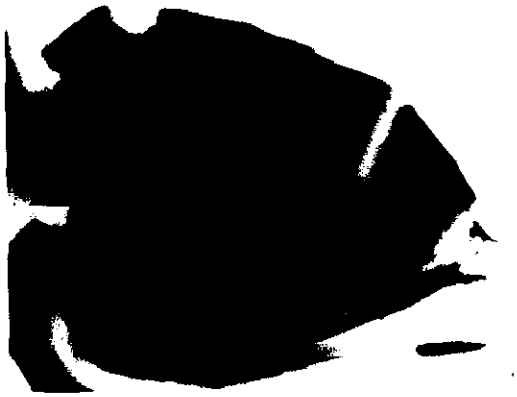

Fig. 8 Metasoma

F4 (in *zhaoi*, F5 distinctly shorter than F4 (18:23)); clava as long as F2-6 combined (in *zhaoi*, clava slightly longer than F3-6 combined); F4 without longitudinal sensilla (in *zhaoi*, F4 with one longitudinal sensillum); anterior scutellum without setae (in *zhaoi*, anterior scutellum with one pair of setae); fore wing 3.33x as long as broad with marginal fringe 0.48x of wing width (in *zhaoi*, fore wing about 2.85x as long as broad, with marginal fringe about one-third of wing width); hind wing 15.4x as long as broad, with marginal fringe 2.4x as long as wing width (in *zhaoi*, hind wing 12x as long as broad with marginal fringe 1.7x as long as wing width).

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